Endangered Species Management Plan
for
Camp Bullis, Texas
FY 05 to FY 09

Prepared by

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EXECUTIVE SUMMARY

Camp Bullis Training Site is a 27,987-acre (11,331 ha) sub-installation of Fort Sam Houston (FSH) located approximately 17.5 miles (28 kilometers) northwest of FSH in Bexar and Comal Counties, Texas. Camp Bullis is the field training site for a multitude of courses conducted by the U.S. Army Medical Department Center and School and the U.S. Air Force Ground Combat Skills School. Camp Bullis' mission also encompasses providing quality resources and training facilities for all branches of the U.S. Armed Forces, Reserve and National Guard units, and law enforcement agencies.

The presence of Federally listed Threatened or Endangered (T&E) species on Camp Bullis is a significant natural resource management challenge for the Army and Camp Bullis. In accordance with the Endangered Species Act of 1973, as amended, the Army must assist recovery of all listed T&E species and their habitats under the installation's management authority. Army Regulation (AR) 200-3, Natural Resources—Land, Forest and Wildlife Management, requires installations to prepare an Endangered Species Management Plan (ESMP) for all Federally listed and proposed T&E species. AR 200-3 also encourages, but does not require, the development of ESMPs for all candidate species, and recommends that an integrated ESMP covering all T&E species be prepared if more than one such species occurs on an installation.

The installation ESMP will be used as a tool to minimize impacts on the training mission while still achieving conservation objectives for populations of listed and proposed T&E species as required by Federal laws and Army regulations. This ESMP is written specifically for natural resource managers and leaders of training operations on Camp Bullis. The objective of this ESMP is to provide a comprehensive plan for maintaining and enhancing populations and habitats of Federally listed and candidate species on Camp Bullis while maintaining mission readiness in a manner consistent with Army and Federal environmental regulations

The installation will prepare and submit a Biological Assessment (BA) to U.S. Fish and Wildlife Service (USFWS) for this ESMP. USFWS will, in turn, issue a Biological Opinion (BO) providing concurrence with the endangered species management practices and goals of Camp Bullis. The BO will be incorporated into the Environmental Assessment (EA) for the ESMP and released to the public for review. Upon completion of the EA process, a Finding of No Significant Impact or Notice of Intent to prepare an Environmental Impact Statement will be issued, as appropriate. The EA will be included as Appendix B of the ESMP.

Table of Contents

List of Figures

List of Tables

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1.0 Introduction

This Endangered Species Management Plan (ESMP) is written to meet requirements of Army Regulation (AR) 200-3, Natural Resources—Land, Forest and Wildlife Management, and the Endangered Species Act (ESA) of 1973, as amended, (Public Law 93-205). This plan: 1) describes the federally listed threatened and endangered (T&E) species found or likely to be found on Camp Bullis as well as T&E species that could potentially be affected by installation activities; 2) discusses potential impacts to T&E species on the installation; 3) defines conservation goals for the installation, and 4) outlines management plans for T&E species and their habitats that will enable achievement of the conservation goals. This ESMP contains general recommendations and site-specific actions designed to protect individual species and their habitat and/or nesting areas. This document covers the period of Fiscal Year (FY) 2005 through FY 2009.

AR 200-3 recommends that an installation ESMP covering all listed and proposed T&E species be prepared if more than one such species occurs on an installation. The installation ESMP should be used as a tool to achieve conservation objectives for populations of listed and proposed T&E species, while minimizing impacts on the installation's mission. AR 200-3 further encourages, but does not require, the development of ESMPs for all candidate species and species of concern. An Environmental Assessment (EA) and a Biological Assessment (BA) have been prepared to assess potential effects of implementation of this ESMP. Upon completion of the National Environmental Policy Act (NEPA) process, a Finding of No Significant Impact was issued. The BA was submitted to the U.S. Fish and Wildlife Service (USFWS) and a Biological Opinion was issued. The Biological Opinion provides concurrence by FWS with the endangered species management practices and goals of Camp Bullis.

This ESMP will be distributed to military and natural resource managers at Camp Bullis, Installation Management Agency (IMA) and to state and Federal resource management agencies. This plan will be reviewed annually and updated as required to meet conservation goals and Army mission requirements. In particular, updated information about population and distribution of T&E species, new research projects, habitat changes, and land use changes will be incorporated in revisions. This ESMP will be incorporated by inclusion or by reference into the installation's Integrated Natural Resources Management Plan (INRMP), which serves as a supporting technical document (U.S. Army 2001b). Once every five years, the INRMP, including the ESMP section, must undergo review (AR 200-3, 9-4). Other supporting technical documents include the EA for the Overall Mission at Camp Bullis, Texas (U.S. Army 2001a) and the Management Plan for the Conservation of Rare and Endangered Karst Species, Camp Bullis, Bexar and Comal Counties, Texas (Veni & Assoc. 2002)

1.1. Location and Background

Camp Bullis is a 27,987-acre (ac) (11,299 ha) sub-installation of Fort Sam Houston (FSH) located approximately 17.5-miles (28.2 km) northwest of FSH in Bexar and Comal Counties, Texas (Figure 1.1). Approximately 2,000 ac (807 ha) of the northernmost portion of the

installation is located in southern Comal County, Texas with the remainder located in Bexar County. The installation occupies a site about 10 miles (16 km) long (north to south) and four miles (6.4 km) wide. The surrounding area was primarily rural until the mid-1900s, but since then has become increasingly urbanized through residential development (U.S. Army 2001b).

The mission of Camp Bullis is to provide quality land and training facilities that support realistic training now and into the future and quality training that is realistic and more difficult than actual battlefield conditions wins wars and saves lives. Camp Bullis provides training opportunities for all branches of the U.S. Armed Forces, Reserve and National Guard units, and law enforcement agencies. Primary use is by active duty units of the U.S. Army and U.S. Air Force. Most notably, Camp Bullis is the field training site for a multitude of courses conducted by the U.S. Army Medical Department Center and School (AMEDDC&S) and the U.S. Air Force Ground Combat Skills School. The U.S. Army also allows limited recreation at Camp Bullis including hunting by active duty and retired military and immediate family members and military affiliated picnics (U.S. Army 1995 and U.S. Army 2001b) and limited use by Boy Scouts and Girl Scouts.

The presence of Federally listed species on Camp Bullis is a significant natural resource management challenge for the Army and Camp Bullis. In accordance with the ESA, the Army must assist in recovery of all Federally listed T&E species and their habitats under the Army's land management authority. Camp Bullis is known to support five Federally listed T&E species (Table 1.1): the golden-cheeked warbler (*Dendroica chrysoparia)* (GCW), black-capped vireo (*Vireo atricapillus)* (BCV), Madla's cave meshweaver (*Cicurina madla)*, and two species of cave beetles (*Rhadine exilis* and *Rhadine infernalis ewersi)*. In addition, there are six Federally listed T&E invertebrates with potential to occur on Camp Bullis and six Federally listed migratory birds with potential to occur on Camp Bullis. Two Federally listed Species of Concern are known to occur on Camp Bullis: Comal blind salamander (*Eurycea tridentifera*), and loggerhead shrike (*Lanius ludovicianus*), which are not specifically addressed in this ESMP. In addition, there are other Federally listed Species of Concern and numerous state listed species having potential to occur but are not currently known, and therefore are not specifically addressed in this ESMP. A complete list of all Federal and state T&E and other sensitive species known, or with the potential to occur, on or near Camp Bullis is provided in Table 6.1 of the INRMP (U.S. Army 2001b). Additional details on other Federal and non-federal listed species is contained in Section 6.10 of the Camp Bullis INRMP and is incorporated herein by reference (U.S. Army 2001b).

This ESMP will specifically address the conservation goals and management needs for the five Federally listed T&E species *known* to occur on Camp Bullis. Due to the low probability of additional species occurring on Camp Bullis and the short duration they are likely to spend on the installation, they will not be covered in detail in this ESMP. However, in the event that any additional Federal T&E species are recorded for the installation, this plan will be amended to address any associated management issues. The Federally listed transitory bird species with *potential* to occur on Camp Bullis are

Figure 1.1. Location of Camp Bullis, Texas.

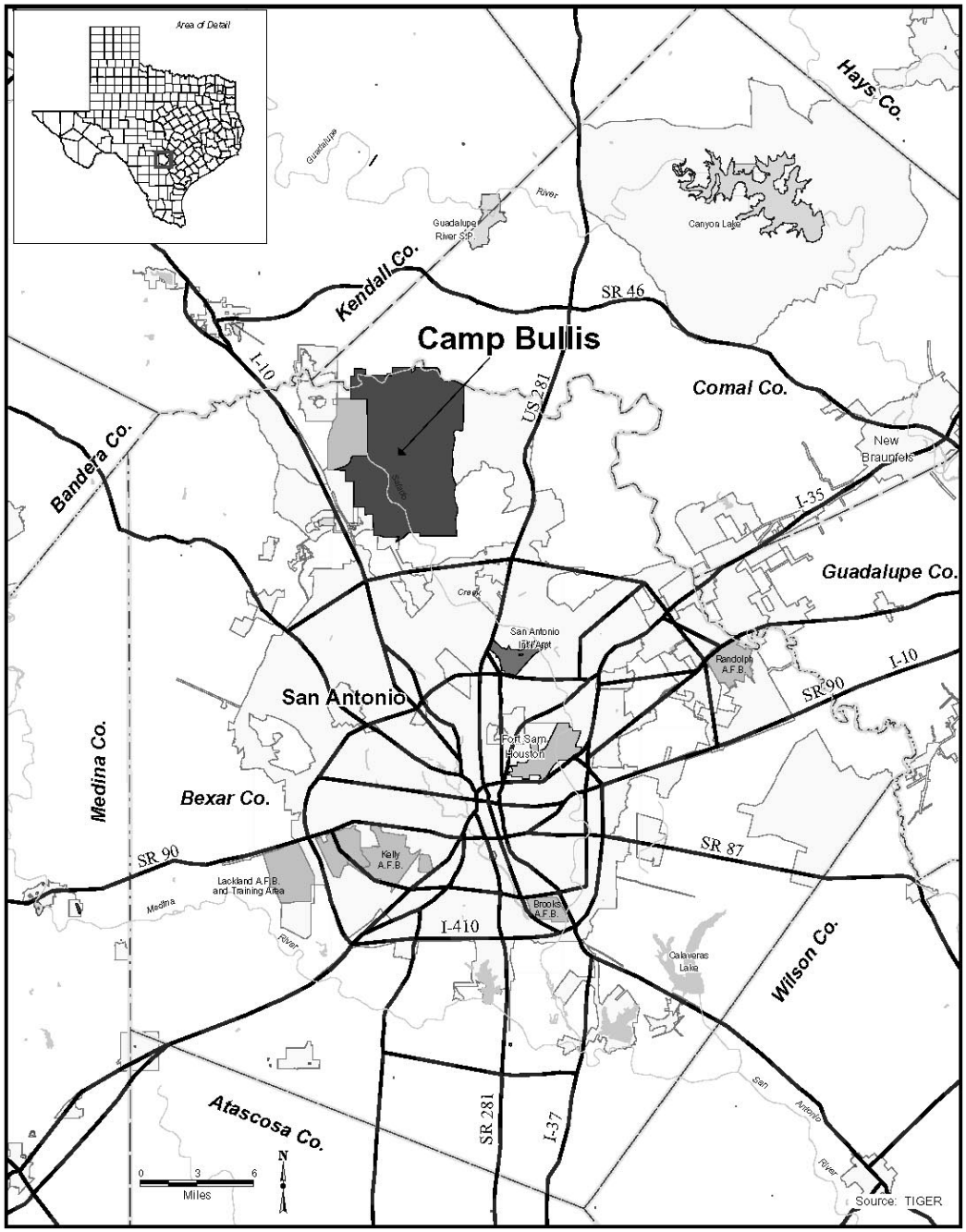


Table 1.1. Federally Listed Threatened and Endangered Species for Camp Bullis.

Common Name	Scientific Name	Listing Status[a]
Listed Species known to occur on Camp Bullis		
Golden-cheeked Warbler	*Dendroica chrysoparia*	E
Black-capped Vireo	*Vireo atricapillus*	E
Madla's Cave Meshweaver	*Cicurina madla*	E
Ground Beetle	*Rhadine exilis*	E
Ground Beetle	*Rhadine infernalis ewersi*	E
Listed Species with potential to occur on Camp Bullis		
Robber Baron Cave Meshweaver	*Cicurina baronia*	E
Bracken Bat Cave Meshweaver	*Cicurina venii*	E
Government Canyon Bat Cave Meshweaver	*Cicurina vespera*	E
Government Canyon Bat Cave Spider	*Neoleptoneta microps*	E
Helotes Mold Beetle	*Batrisodes venyivi*	E
Cokendolpher Cave Harvestman	*Texella cokendolpheri*	E
Potential transitory listed species for Camp Bullis		
Brown pelican	*Pelecanus occidentalis*	E
Wood stork	*Mycteria americana*	E
Whooping crane	*Grus americana*	E
Least tern	*Sterna antillarum*	E
Piping plover	*Charadrius melodus*	T
Bald eagle	*Haliaeetus leucocephalus*	T

[a] Federal listing status; E = Endangered, T = Threatened

addressed in the management/protection provisions for other species of concern (also in Chapter 4).

1.2. Objective

The objective of this ESMP is to provide a comprehensive plan for maintaining and enhancing populations and habitats of Federally listed T&E species on Camp Bullis in a manner consistent with Army and Federal environmental laws and regulations. This plan will help ensure the conservation of the BCV, the GCW and karst dependent species as well as comply with the ESA and AR 200-3. This plan was prepared in fulfillment of the requirements of the ESA of 1973, AR 200-3, and the BCV and GCW Recovery Plans (USFWS 1991 and 1992).

1.3. Management Approach

Ecosystem management, through habitat protection, maintenance and enhancement, is the central focus of the ESMP. Disturbance or alteration of certain identified habitats could negatively impact the species dependent on them. Development of this ESMP is also based on the concept of adaptive management. Adaptive management is founded on the principle that management of renewable natural resources involves a continual learning process (Walters 1986). This concept is a key guiding principle in the Department of Defense's (DoD) ecosystem management policy and is promoted as an effective approach to successful T&E species recovery.

This ESMP is based on the premise that protection, management, inventory, monitoring, and research are necessary components of an integrated, adaptive management approach for T&E species on Camp Bullis. In this ESMP, objectives, justifications, and actions are developed and implemented under a framework that is mutually supportive of these components.

Camp Bullis has several years of natural resource and endangered species inventory, monitoring, and research data to assist in developing this ESMP. The ongoing T&E research and monitoring programs implemented on Camp Bullis for the GCW date back to 1991, 1989 for BCV and 1994 for the Karst species. The information from this research and ongoing programs is the most comprehensive and credible source of information available for Camp Bullis. Information for this ESMP was gathered from installation project status reports, endangered species survey reports, reports from cave research dating back to 1994, and other published and unpublished documents. Even with this wealth of information, this ESMP recognizes the current state of knowledge is incomplete in many cases and further reinforces the adaptive management concept as a necessary and continual learning process for T&E species management on Camp Bullis. AR 200-3, 11-6(6)e, provides the mechanism for incorporating new information and approaches by requiring annual reviews and major revision of this ESMP every five years.

2.0 Site Description and Land Use Activities

This chapter briefly describes the installation's history, environmental setting, and current military and land use activity information. A comprehensive discussion can be found in the Installation Integrated Natural Resources Management Plan (INRMP) (U.S. Army 2001b) and the Environmental Assessment of the Overall Mission. (U.S. Army 2001a) These activities include military training and facilities uses that are necessary to accomplish routine mission requirements.

2.1 Environmental Setting

A detailed description of the environmental setting, including topography, climate, geology, surface water, ground water and vegetation can be found in Chapter 6 of the Camp Bullis INRMP (U.S. Army 2001b) and is incorporated herein by reference. Soils are discussed below as Camp Bullis has completed a new soil survey since the INRMP.

2.2 Soils

Eckrant and Fischer soils, which are shallow soils formed over limestone, are the two major soil associations on Camp Bullis. These soils are not well suited for crops because of high pH and low nutrients, and are used primarily for rangeland. Eckrant association soils are stony soils of limestone prairies occurring on gently undulating, one to five percent slopes. Fischer soils are comprised predominantly of clay and loam and occur on steeper (5 to 20 percent) slopes, while the Fischer - Eckrant association can occur on slopes as steep as 60 percent. Both of these soils are well drained but have high erosion potential. In lower areas between the hills and in streambeds, Krum and Crawford soils are predominant. Clay soils of the Krum complex are moderately deep and occur on gentle foot slopes below Eckrant and Fischer soils. Crawford soils are comprised of predominately stony soils occurring on nearly level to gently undulating areas with slopes ranging from zero to five percent. The Tinn association is found along the Salado Creek stream bed. These soils are clay and clay/loam soils occurring in floodplains of small streams and larger drainages and are flooded at least once per year. Lewisville, Patrick, and Sunev soils are found along stream terraces scattered throughout the Camp. These soils are fertile and support excellent grass cover. Erosion hazard is not great as long as natural vegetation is not removed.

2.3 Current Mission

The mission of Camp Bullis is described in detail in the Environmental Assessment Of The Overall Mission (U.S. Army 2001a) and the Integrated Natural Resources Management Plan (U.S. Army 2001b). Those documents are incorporated herein by reference

3.0 Species Accounts and Current Status on Camp Bullis

The following sections provide a description of the five Federally listed endangered species found on Camp Bullis: the golden-cheeked warbler (*Dendroica chrysoparia)*, black-capped vireo (*Vireo atricapillus)*, Madla cave meshweaver (*Cicurina madla)*, and two species of cave beetles (*Rhadine exilis* and *Rhadine infernalis ewersi).* Other species of concern that occur as transients on Camp Bullis are also briefly described.

3.1 Golden-cheeked Warbler

Species Account:

Scientific Name: *Dendroica chrysoparia*
Family: Emberizidae
Current Federal Status: Endangered (55 FR 53153-53160 [27 December 1990]), ESA

Species Description:

The GCW is a small, migratory songbird, 4.5 to 5 inches long, with a wingspan of about 8 inches. The male has a black back, throat and cap, as well as black streaks on the flanks. The wings are black except for two distinct white bars. They have very distinctive cheeks colored bright yellow with a black stripe through the eye. Females have less color than males, with a yellowish throat and a blackish upper breast. Detailed descriptions can be found in Pulich's (1976) *The Golden-Cheeked Warbler.*

Distribution:

The distribution of the GCW in central Texas is an area roughly corresponding with the distribution of Ashe juniper (Pulich 1976). The warbler's entire nesting range is currently confined to 35 counties in central Texas. Figure 3.1 shows the current breeding range of GCW in Texas.

Life History:

GCWs arrive in south-central Texas in early March and nest in mature stands of trees such as Texas oak, live oak, hackberry, sycamore and pecan associated with Ashe juniper. GCWs nest once in spring (April) and have a single clutch of three to four eggs (Oberholser, 1974). Nests are constructed of strips of Ashe juniper bark and lined with rootlets, feathers and hair. Nest placement is generally in the upper third of the canopy. After about two months (from late-June to mid-August), GCWs migrate to southern Mexico and Central America (Guatemala, Honduras, and Nicaragua) (Campbell 1995).

General Habitat Description:

The USFWS recovery plan provides a general overview of warbler habitat requirements (USFWS 1992) and includes Ashe juniper and a variety of oak species with several other

hardwood species occurring as well (Pulich 1976). Trees commonly found in GCW breeding habitat include Ashe juniper, Texas oak (*Quercus shumardii* var *texana)*, live oak (*Quercus virginiana*), Lacey oak (*Q. glaucoides*), post oak (*Q. stellata*), black-jack oak (*Q. marilandica*), American elm (*Ulmus americana var americana*), cedar elm (*U. crassifolia*), hackberry (*Celtis reticulata*), Texas sugarberry (*C. laevigata var smallii*), little walnut (*Juglans microcarpa*), Arizona walnut (*J. major*), sycamore (*Platanus occidentalis*), Texas ash (*Fraxinus texensis*), coma (*Bumelia lanuginosa*), Texas redbud (*Cercis canadensisvar texensis*), western soapberry (*Sapindus saponaria var drummondii*), deciduous holly (*Ilex decidua*), escarpment blackcherry (*Prunus serotina var eximia*), Mexican buckeye (*Ungnadia speciosa*), red mulberry (*Morus rubra*), and Texas mountain laurel (*Sophora secundiflora*) (USFWS 1992). While Ashe juniper is the dominant woody species throughout the warbler range, the composition of oak species varies geographically (Ladd 1985; Ladd and Gass 1999). Arnold, Coldren and Fink (1996) reported that 57 ac (23 ha) may be the minimum threshold size of habitat in which GCWs can produce young, although Coldren (1998) found that GCWs select habitat patches greater than 247 ac (100 ha). GCWs need a mix of mature Ashe juniper and hardwoods at least 20 years old and 15 feet (4.6 m) tall (Oberholser 1974). Ashe junipers of this age group usually have shredding bark used for nest construction. Nesting territories range from five to 20 ac (two to eight ha) (Oberholser 1974).

Threats to Survival:

Threats to GCWs identified in the 1992 Recovery Plan (USFWS 1992) include breeding habitat loss, loss of winter and migration habitat, habitat fragmentation, nest parasitism by cowbirds, loss and destruction of juniper habitat, and destruction of oaks. A more recent Population Viability Analysis (PVA) document (USFWS 1996) also identifies concerns related to reservoir development, oak wilt, predation, and secondary effects of urbanization in proximity to warbler habitats.

Habitat loss associated with urban development and clearing for agricultural practices are continued threats to GCWs. Pulich (1976) estimated that juniper eradication programs for range improvement reduced juniper acreages in Texas by 50 percent between 1950 and 1970. Based on satellite imagery from 1974 through 1981, Wahl et al. (1990) reported warbler breeding habitat loss of approximately four percent per year over a 10-year period in urbanizing areas and about two to three percent per year in rural areas. Subsequent satellite imagery may show that the rate of habitat loss has increased in recent years (Grzybowski 1990). Estimates of loss of wintering habitat in Central America (two to four percent per year) are similar to estimated losses of breeding habitat (Jahrsdoerfer 1990; Lyons 1990).

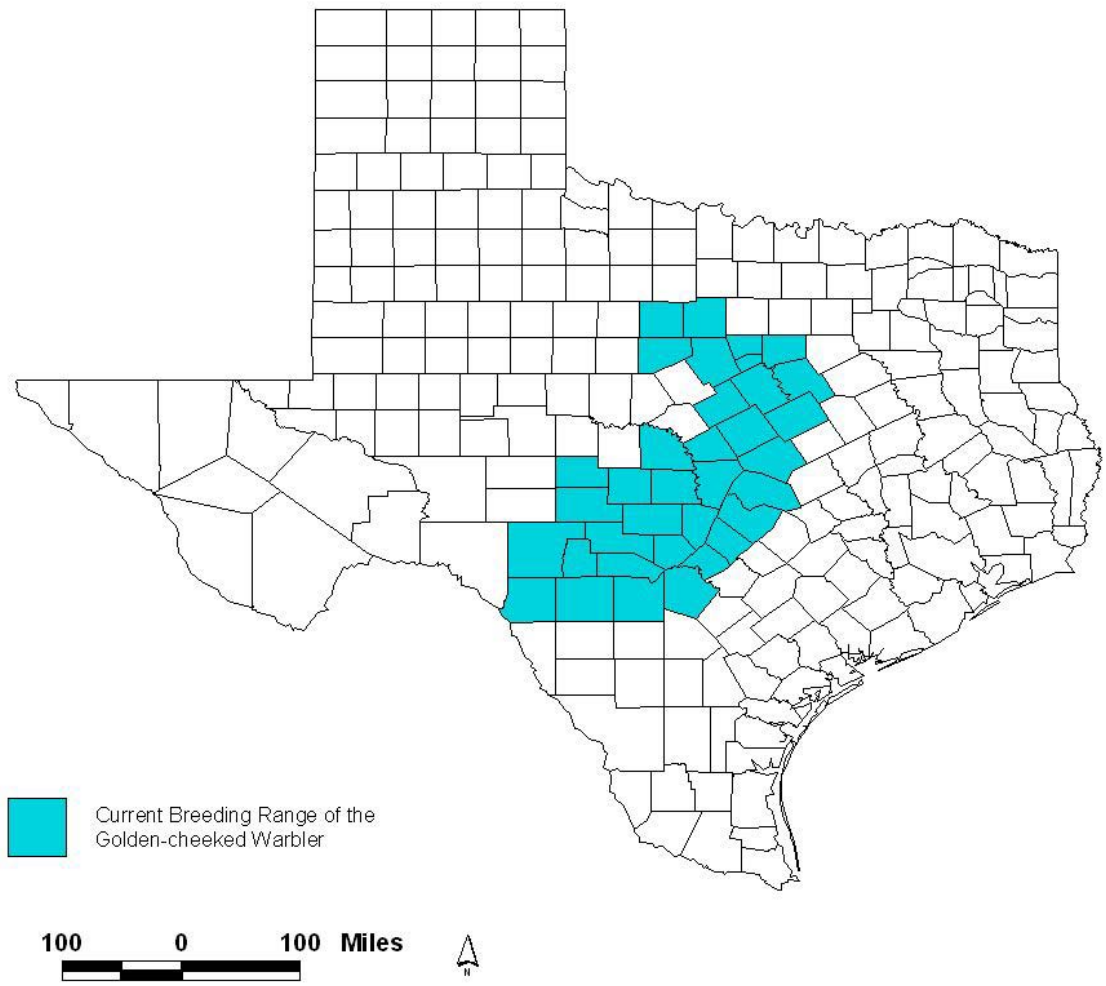
Loss of habitat has resulted in increased fragmentation of GCW habitat. Although habitat fragmentation has been suggested as a cause of population declines in other songbird species (Gates and Gysel 1978; Brittingham and Temple 1983; Wilcove 1985; Andren and Angelstrom 1988; Pease and Gingerich 1989), the relative effects of habitat fragmentation on golden-cheeked warblers are largely unknown (USFWS 1992). Synergistically, habitat fragmentation may make warblers more susceptible to depredation by blue jays in urban areas (Engels and Sexton 1994) and more susceptible to nest parasitism by cowbirds (Brittingham and Temple 1983; Robbins et al. 1989; Thompson 1994). Coldren (1998) found that GCWs selected for habitat

patches > 247 ac (100 ha) and that territory placement selected against urban land uses including commercial development, entertainment, forested non-warbler habitat, high-density transportation, and utilities.

GCWs are susceptible to cowbird parasitism (Pulich 1976). Brittingham and Temple (1983) have shown that cowbird parasitism reduces productivity in host species. Land use practices which increase the incidence of cowbird parasitism include habitat fragmentation, cattle grazing, and increased urbanization may contribute to limited productivity in GCWs. Though not utilized for cattle grazing, the effect of cowbird parasitism on Camp Bullis is unknown (Thompson 2001).

Oaks are a necessary component of GCW habitat. Loss of oaks in GCW habitat is attributed to disease (oak wilt fungus, *Ceratocystis* spp.) and over-browsing by white-tailed deer, goats, and various exotic ungulates. Oak wilt fungus has been noted in some areas of Camp Bullis. The extent to which oak wilt fungus has affected oak populations on Camp Bullis has been evaluated by review of aerial photographs and visual inspection of the installation. Currently, oak wilt seems to be confined to two locations on Camp Bullis.

Figure 3.1. Current Breeding Range Of The Golden-Cheeked Warbler.



Camp Bullis Golden-cheeked Warbler Habitat:

GCWs on Camp Bullis appear to occupy habitat similar to that explained in the General Habitat Description section. However, some areas that appear to be acceptable habitat are not occupied, while other areas that do not seem to have the vegetation make-up to provide good habitat are occupied. Research is currently being conducted to determine what factors influence habitat selection by GCW on Camp Bullis. Additionally, some 2,400 ac (972 ha) were determined to be potential GCW habitat during the 2001 field season (Performance Group, Inc. 2001). These areas of potential habitat are being monitored and surveyed according to USFWS protocol over the next three years to determine if these areas will be designated as habitat or non-habitat.

Distribution on Camp Bullis:

Camp Bullis provides over 7,676 ac (3,106 ha) of GCW habitat. GCW have been found in all areas of the Installation with suitable habitat (Figure 3.2). Based on surveys conducted the past 11 years three sub-populations have been designated within the Installation due to the relatively high concentrations of GCW. These areas are: 1) Bullis Hills, 786 ac (318 ha); 2) Lewis Creek Valley, 1,075 ac (435 ha), and; 3) Cibolo Creek, 734 ac (297), (Thompson 2001). GCW have also been observed in areas surrounding Camp Bullis, including Eisenhower Park to the south, and Friedrich Wilderness Park to the west.

Survey Methods/Population Monitoring:

Camp Bullis has conducted annual surveys for the presence of GCW since 1991 using point count surveys. This method is widely used to count songbirds, particularly in France and America (Bibby, 1992). These surveys are designed to provide a relative density of breeding males. Beginning in 1998 additional research was begun into territory size. Detected territories are marked in the field during the survey period and later a small number is delineated and mapped. Further research into the distribution of GCW was begun in 2001. All known and suspected habitat is surveyed for the presence/absence of GCW. This methodology has provided the installation with a 10-plus year history of the relative density of the species, has begun to provide information about the size of territories and has provided a better understanding of the distribution of GCW on Camp Bullis. This baseline data is used by the installation for long range planning purposes and to measure any impacts training and other activities might have on the population of GCWs.

Point Count Surveys are used on Camp Bullis to analyze GCW populations, with biologists running survey lines that were established in 1991 (Stewardship Services 1991). A total of 60 survey lines with from 4 to 11 observation points on each line (a total of 445 points) are employed. The points are separated by approximately 656 feet (200 m). At each observation point the field observer records the number of GCW detected in 10 minutes. Surveys begin 30 minutes after sunrise and are completed by 11:30 AM. Surveys are not conducted when winds exceeded 12 miles per hour (mph) (19 km/hr), at temperatures below 45°F (7.2°C), or when raining heavily. USFWS protocol requires that such surveys be conducted between March 20 and May 15 (USFWS 2001a).

Prior to the 2001 field season, a statistical analysis of the survey lines and the results for a 10 year period prior was conducted (Fischer. 2001). This analysis revealed that the point count level of effort could be reduced, while increasing the reliability of the results. Based on this information during the 2001 surveys and since, 36 survey lines were utilized for point count surveys (Performance Group, Inc 2001).

Density estimates are employed to determine the population trend of GCW. The estimate is based on a detection radius of 328 feet (100 m) at the observation points and is calculated as GCW per hectare (ha). Survey lines that are run more than once per season are averaged to obtain a single estimate of GCW density per line. Detection of GCW on survey lines and density estimates are tools that can approximate population trends. GCW presence/absence on the survey lines can suggest GCW distribution and density estimates can determine GCW concentrations at specified points within that distribution.

To obtain estimates of the annual reproductive success of GCW, Camp Bullis used an index developed by Vickery et al. (1992). The technique was developed to detect breeding behavior in species with inconspicuous nests. Therefore, rather than recording nest locations, the observer records mating/nesting behavior. The success index is estimated by monitoring territories on a standardized time schedule. Observing male GCW territory defense behavior delineates boundaries of each mating territory.

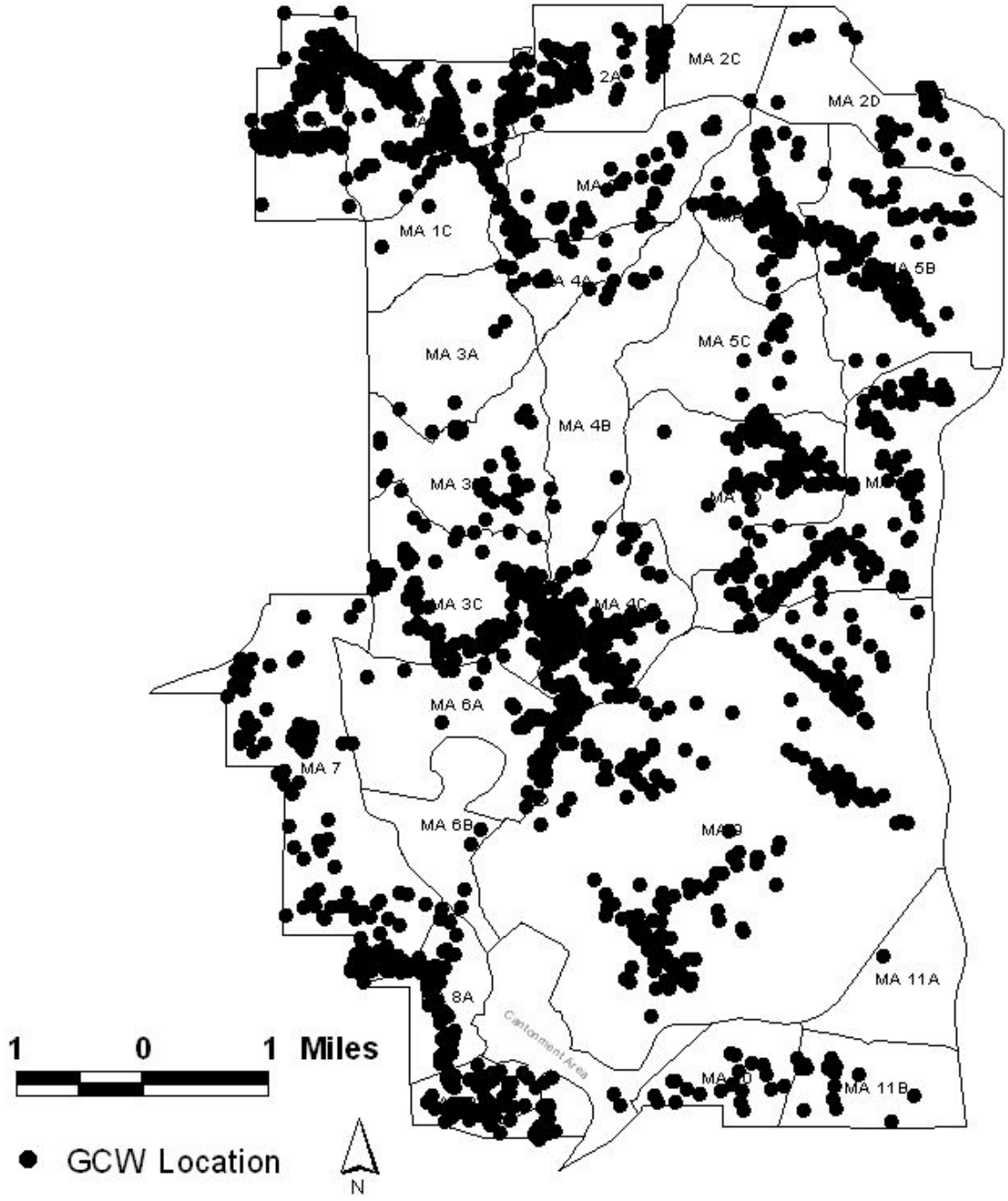
Each year's results are entered into the installation's geographic information system (GIS) database. This information is then used to produce an annual restricted area map, and to analyze the season's survey results.

In 2001, in addition to the 36-transect surveys and for the first time throughout Camp Bullis, an installation-wide survey was conducted in potential GCW habitats to document presence/absence of territorial GCW males. All areas on the installation covered in suitable vegetation were surveyed. Priority was placed on areas identified by installation personnel for designation as non-GCW habitat or potential habitat that will not be subject to training restrictions. These areas may not have been included in the point count survey, but because they offered potential habitat for GCW and/or were under consideration for various management strategies, they were also surveyed. Given extra time with the decreased number of transect lines, field personnel were able to cover all areas throughout Camp Bullis.

Estimated densities from point count surveys show an increasing trend for GCW populations from 1991 through 2002 (Figure 3.3). Estimates of density from point counts on Camp Bullis should be considered as indexes of density rather than absolute estimates of density. Mean estimated density from a sub sample of 24 survey lines[1] (4-11 sample points per line) over 11 years (1991-2001) was 7.1 adult males per 247 ac (100 ha) with a range of 4.8 – 8.5 males per 100 ha. The density estimates are summarized in Figure 3.3.

[1] The 24-line sub-sample was subjectively selected as representing more optimal habitat areas for GCWs on Camp Bullis (Stewardship Services 1995).

Figure 3.2. Locations of GCW, 1989 to 2002.

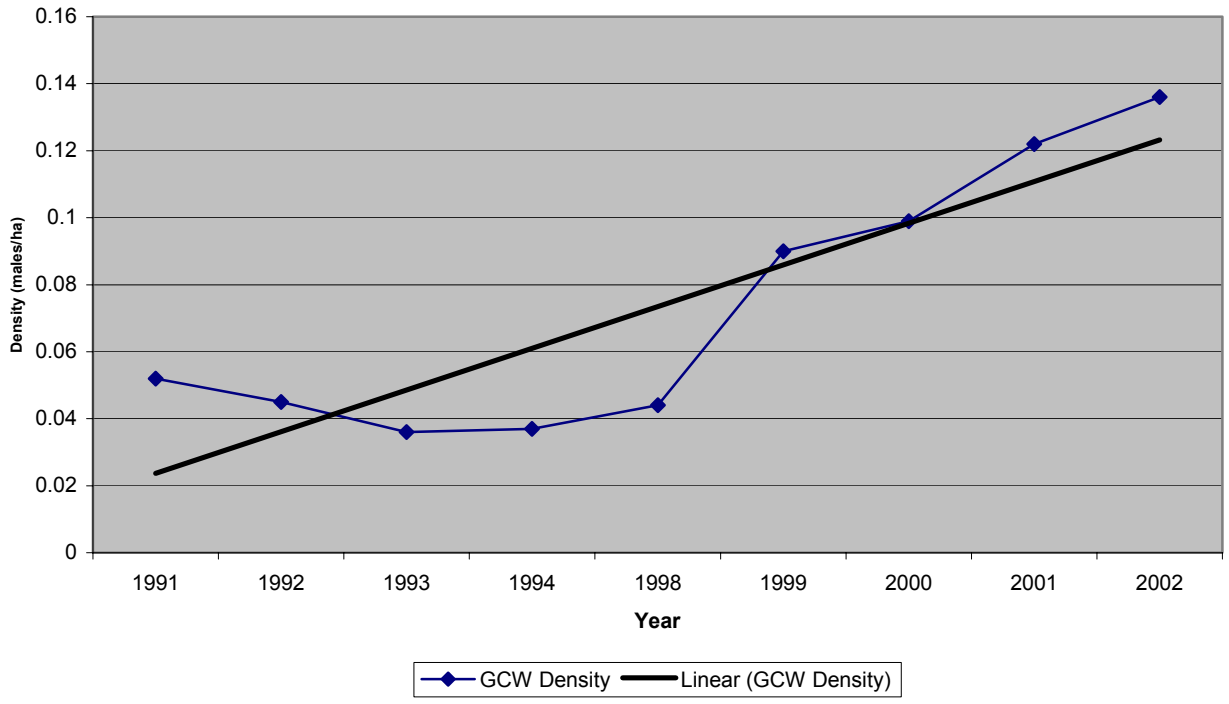


Estimates for Camp Bullis were lower than estimates derived from territory mapping of warblers on several study sites in the Austin area (range 4.5 –29.1 males per 100 ha; Keddy-Hector *et al.* 1998) and from one study site on Fort Hood (range 13.5 – 28.1 males/100 ha, 1992-96; Jette *et al.* 1998). However, point counts likely underestimate densities relative to estimates derived from territory mapping. The full 60-line sample was representative of all woodland habitats on Camp Bullis. The selection criteria likely account for the consistently higher estimates from the 24-line sub-sample compared to the full 60-line sample.

Monitoring of GCW territories was first conducted in 1998. Evidence of a pair was found on 14 of 22 territories (63.6 percent) monitored. Pairing success was comparable to observations at study sites near Austin (range 22 – 71 percent; Keddy-Hector *et al*. 1998) and below estimates of pairing success from one study site on Fort Hood (range 79 – 94 percent; Jette *et al*. 1998). Fledglings were detected on 11 territories (50 percent nest success). Nesting success in 1998 on Camp Bullis was slightly better than nesting success observed at the Austin study sites (range 26 – 45 percent; Keddy-Hector *et al*. 1998) and below rates observed on the Fort Hood study site from 1992 through 1996 (range 78 – 90 percent; Jette *et al*. 1998).

The results of the 2002 survey indicate the continued population growth of GCW on Camp Bullis (Performance Group, Inc. 2002). GCW density estimates indicated a 37

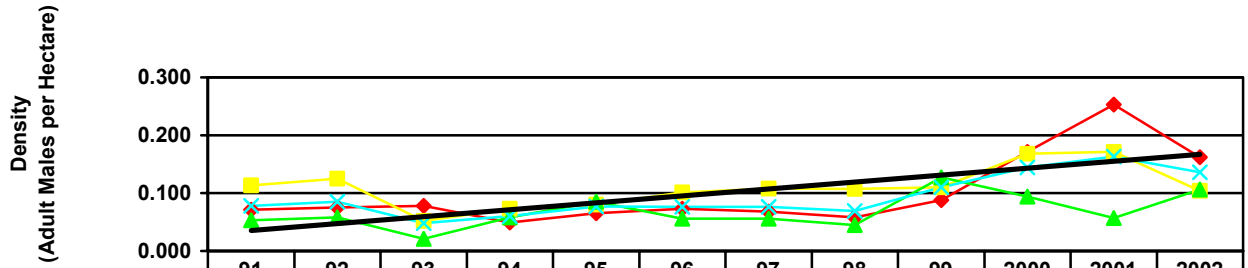
Figure 3.3. GCW Population Trend. 1991 – 2002[2]



[2] Some years are missing because the full 60 line compliment was not surveyed during those years. Figure 3.4 shows the population trend for those years.

percent increase over the 2000 inventory and 200 percent over the 1998 survey. Several factors, both on and off Camp Bullis, could be contributing to this growth. Surrounding pressures include development around Camp Bullis that results in destruction of habitat and a reduction in the amount of available habitat. Possible factors on Camp Bullis include an increase in available habitat as younger vegetation matures and improved management actions.

Figure 3.4. Estimated GCW Sub-Population Densities and Population Trend[3] on Camp Bullis, 1991 - 2002



	91	92	93	94	95	96	97	98	99	2000	2001	2002
Cibolo	0.071	0.075	0.078	0.049	0.065	0.073	0.068	0.058	0.088	0.171	0.253	0.162
Lewis Valley	0.113	0.125	0.052	0.073	0.080	0.101	0.108	0.107	0.110	0.168	0.171	0.104
Bullis Hills	0.053	0.058	0.021	0.058	0.085	0.056	0.056	0.045	0.127	0.094	0.057	0.106
Average	0.078	0.085	0.048	0.060	0.077	0.076	0.076	0.069	0.110	0.144	0.163	0.136

Year

Golden-cheeked Warbler Habitat Analysis:

As mentioned previously, the preferred habitat of GCW is the mature Ashe juniper/mixed oak community, which is relatively abundant on Camp Bullis. Habitat is characterized by high to moderate canopy closure (over 50 percent) and relatively tall stand height (over 15 feet [4.6 m]). GCW habitat generally contains about 10 percent or greater mature Ashe juniper with mixed hardwoods, predominately oaks. Tree density ranges from about 140 to 775 trees per acre (57 to 314 trees per ha). Hardwood trees are used for foraging and the bark of mature Ashe junipers is used for nest construction (USFWS 1992). Texas oak appears to be strongly associated with quality GCW habitat. The Texas oak, which is closely related to the red oak (*Quercus rubra)* of the eastern forest, or a subspecies of that oak, prefers a forest environment (Correll and Johnston 1979). Germination rates and survivorship of seedlings of the Texas oak is highest under a closed canopy environment provided by more sun loving hardwoods. For this reason, habitat fitting the described parameters with at least 10 percent mature Ashe juniper and containing Texas oaks can be suspected to contain GCW nesting territories (Thompson 2001).

[3] Linear Trend computed from all values in table.

Most GCW habitat is associated with steep slopes due to the canyon effect on the partially shaded, better watered, vegetation associated with north and east facing slopes (USFWS 1996). GCW appear to be attracted to moist areas such as canyons and hillsides where deciduous hardwood vegetation is abundant. However, GCW will also occupy flat riparian drainages with cedar elm/hackberry/live oak associations, but population stability and productivity have not been determined for these habitat types (USFWS 1992).

3.2 Black-capped Vireo

Species Account:

Scientific Name: *Vireo atricapillus*
Family: Vireonidae
Current Federal Status: Endangered (52 FR 37420-37423 [6 October 1987]).

Species Description:

The black-capped vireo (BCV) is a small, insectivorous migratory songbird about 4.5 in. in length. Adult males have are olive green on the back, white below with yellow to yellowish green flanks. They have conspicuous white spectacles that are formed by an eye ring and loral stripe. Adult females are similar, generally having a gray head. Detailed descriptions are provided in the Black-Capped Vireo Recovery Plan (USFWS 1991)

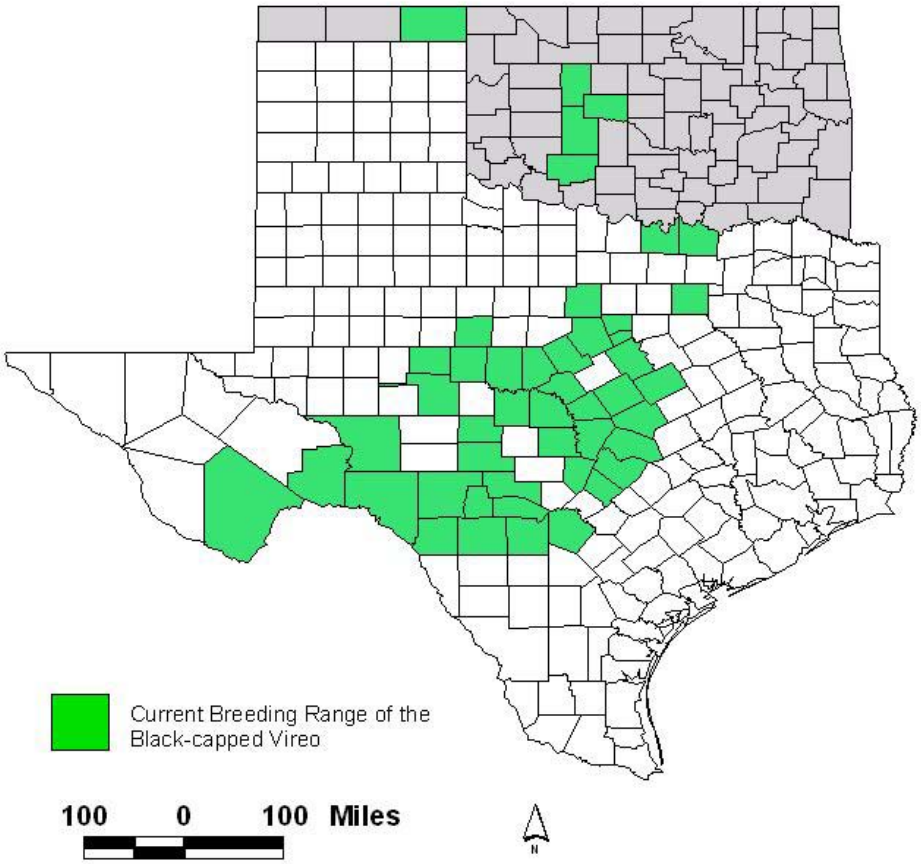
Distribution:

The BCV appears to be declining in many areas of Texas (Grzybowski 1995; USFWS 1991). The historic breeding range is believed to be from south-central Kansas through central Oklahoma and Texas to Coahuila, Mexico and possibly Nuevo Leon and Tamaulipas, Mexico. The current breeding range in the U.S. is limited to Oklahoma and Texas (Figure 3.4). BCVs have been reported in at least 40 counties in Texas (Beardmore and Hatfield 1995). The current breeding range of BCV extends from southern Oklahoma, through central Texas and into northern Coahuila, Mexico. Currently the greatest numbers of BCV breeding territories are in the central and western Edwards Plateau and Lampasas Cut Plains regions of central Texas (USFWS 1991). Major Texas BCV populations are known from the Austin area including Kerr County, and Fort Hood (Bell and Coryell Counties), although populations are somewhat discontinuous throughout the BCV range.

Life History:

BCV arrive on the Edwards Plateau during late March to early April. Nests are pendulous and placed generally in the forks of branches three to 10 feet (3.0 m) above the ground. Nesting territories are usually two to four acres (0.5 -1.6 ha), but can range from one to 10 acres (0.4 - 4.1 ha). BCVs may nest more than once per year (Peterson 1988). The first clutch usually contains three to four eggs, with later clutches containing only two to three eggs. After the young are completely fledged (July through August), BCVs migrate to their wintering grounds along Mexico's west coast (Oberholser 1974).

Figure 3.5. Current Breeding Range of BCV



General Habitat Description:

Tree species favored by the BCV include shrubby stands of mixed broad-leaved trees such as scrub oaks, live oak, hackberry, persimmon, and sumac. One common BCV habitat characteristic is the presence of hardwood foliage to ground level. BCVs also prefer areas with a low Ashe juniper (about three to five percent cover) density (Oberholser 1974). This type of cover, interspersed with grass and low forbs, form the elements of suitable nesting habitat. BCV are found in hardwood scrub with a patch or clumped distribution of shrubs and thickets. Suitable shrub habitat exists primarily on rocky substrates with shallow soils, rock gullies, edges of ravines, and on eroded slopes. On the Edwards Plateau, burns in Ashe juniper-mixed oak vegetation complexes likely maintained BCV habitat historically. In the eastern parts of the range, preferred habitat often results from fire within stands of mature oak-juniper and remains

suitable for five to 25 years after fire. The best BCV habitats found by Marshall *et al.* (1985) were in 10- to 15-year-old burns that were hot enough to kill junipers.

BCV nesting habitat in the Edwards Plateau is usually correlated with shallow limestone soils. Shallow soils inhibit the root development of woody species and contribute to a dwarf structure of the woody components of the community over an extended period of time. These soils retard the growth of woody vegetation and therefore help to counteract the natural trend towards plant succession (Taylor *et al.* 1991). However, in the eastern Edwards Plateau, BCVs are still largely restricted to a fire maintained successional window and shallow limestone soils are often not associated with BCV breeding habitats in other areas of their range.

Secondary habitat elements are structural heterogeneity, low percentage of Ashe juniper cover and the patchiness of open spaces. Shin oak, Texas oak, and live oak are the dominant oaks in BCV habitats in Texas (Graber 1961; Grzybowski 1986). Durand oak (*Quercus sinuata* var. *breviloba*) and live oak are the primary tree species forming this type of habitat on the Edwards Plateau. Many of the dominant tree species forming BCV breeding habitat are fire adapted and resprout after burning.

No single woody species is predominant over the entire BCV breeding range, although most habitats are dominated by some species of oak. Woody vegetation frequently used for nesting habitat in the Edwards Plateau includes Durand oak, sumac, Texas persimmon, and Texas mountain laurel.

Threats to survival:

Major threats to the continued existence of the BCV include (1) nest parasitism by Brown-headed cowbird (2) loss of habitat due to the following: urban development, rangeland improvement, grazing by sheep, goats, and exotic herbivores, intensive browsing in areas with deer populations, and natural succession, including juniper invasion (Grzybowski 1995; Shull 1986; Ratzlaff 1987). Other factors attributed to the decline in BCV populations include suppression of fire and other human disturbance. The BCV recovery plan (USFWS 1991) documents regional threats to survival.

This species is very vulnerable to changes in the relative abundance of its habitat caused by both Ashe juniper invasion and human disturbance/intervention (USFWS 1991). Compounding this vulnerability is the fact that BCV have low reproductive and recruitment rates due to nest parasitism, predation, and the use of pesticides (USFWS 1991). Parasitism by brown-headed cowbirds has been documented as a significant limiting factor in reproductive success of BCV (Graber 1961; Grzybowski 1995; Grzybowski *et al.* 1986; Grzybowski 1988, 1989, 1990). Nest parasitism by cowbirds has been severe in locations such as Fort Hood, Texas. Nest success rates have been directly correlated with the control efforts including aggressive cowbird trapping and shooting efforts. Since beginning aggressive control of cowbirds, parasitism rates have dropped dramatically.

Camp Bullis Black-capped Vireo Habitat:

Little suitable BCV habitat occurs on Camp Bullis. Ashe juniper invasion and the fact that Camp Bullis is south-southeast of the main migration corridor contribute to the low numbers. BCVs are predominantly found in the MA 9 live-fire area on Camp Bullis where fires are more frequent.

Distribution on Camp Bullis:

BCV habitat requirements include low-growing patches of dense shrubs or trees separated by areas of open grassland as is produced in areas that are often burned or mowed. Distribution of the BCV is patchy on Camp Bullis, and occurs primarily in the MA 9 impact area. Territories have been documented over the years in MA's 4C, 5D, 5E, 6A, and 7. Currently, Camp Bullis has an estimated 151.7 ac (61 ha) of BCV habitat, primarily located in MA9 (132.4 ac, 53.6ha), with 19.3 ac (7.8 ha) in MA 6A. BCV have also been observed in Friedrich Wilderness Park to the west of the installation. BCV habitat on Camp Bullis is shown in Figure 3.6.

Survey Methods/Population Monitoring:

Camp Bullis has been surveyed annually for the presence of BCVs since 1989. The BCV survey period runs from April 10 through July 15 and is designed to document all breeding males. The detected territories are marked in the field during the survey period and later delineated and mapped. This methodology has provided the installation with a 10-plus year history of the breeding territories of the species that can be used by the installation for long-range planning purposes.

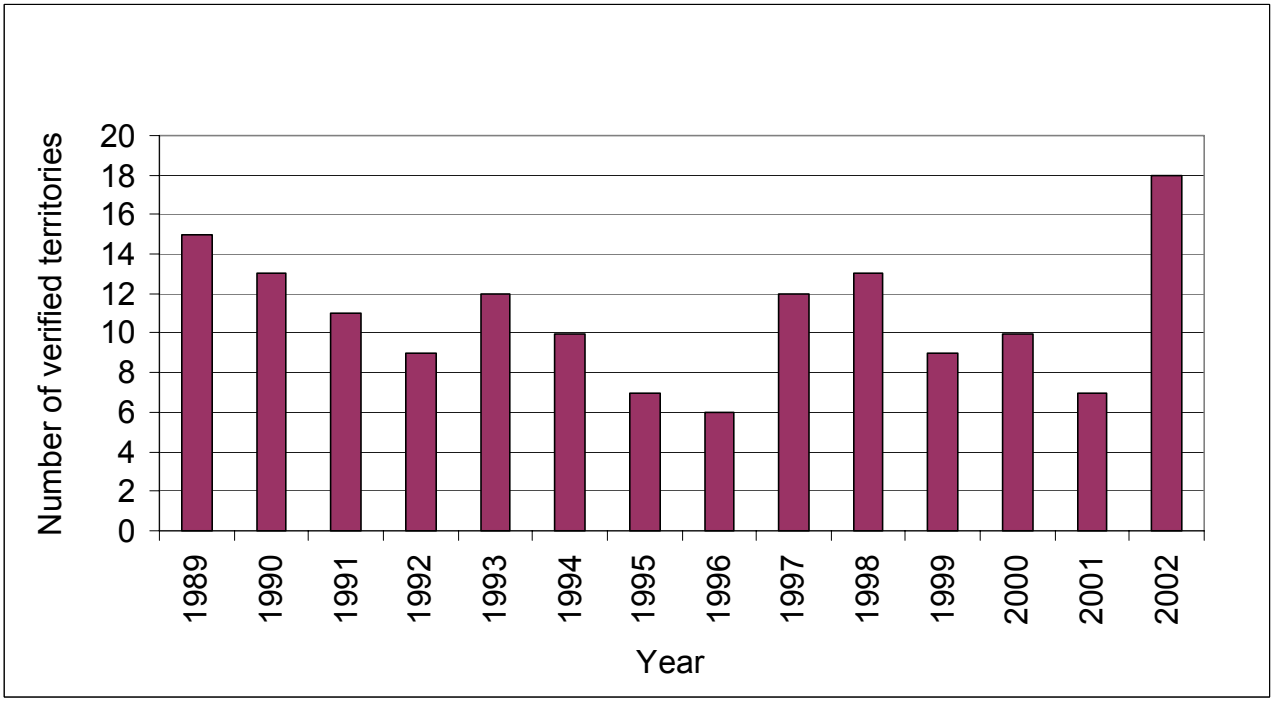
BCV surveys from 1989 through 2002 identified an average of 11 different BCV territories on Camp Bullis per year (range = high 20, low 6) (Figure 3.5). All known and potential BCV habitat is visited annually and checked for the presence/absence of BCV. Areas where BCV are detected receive repeat visits during the breeding season, when possible. Data recorded at each site visit are the presence of males, male/female pairs, nesting behavior, contents of nest, evidence of nest parasitism and number of fledglings. The USFWS survey window for this species is April 10 to July 15 (USFWS, 2001a). Weinberg (1999) summarizes status surveys and methods for BCVs on Camp Bullis.

The majority of BCV territories are located within the MA 9 impact area. Based on annual surveys from 1989-2002, the annual Camp Bullis BCV population was found to range from six to 18 territories annually (Figure 3.5), with an average territory size of seven ac (2.8 ha). Variation among years is attributable in part to access limitations in the impact area (Weinberg 1999).

Systematic monitoring of BCV nesting attempts was conducted only in 1998. Mated pairs were detected on eight of 13 territories (62 percent). Four territories were known to successfully fledge vireo young. Two of four active nests were parasitized by brown-headed cowbirds, one of which fledged a cowbird. Interestingly, 23 nest starts that did not proceed to egg laying were located on seven territories. It should be noted that 1998 was a drought year with record high

temperatures and may not reflect the normal reproductive potential of the BCV population on Camp Bullis.

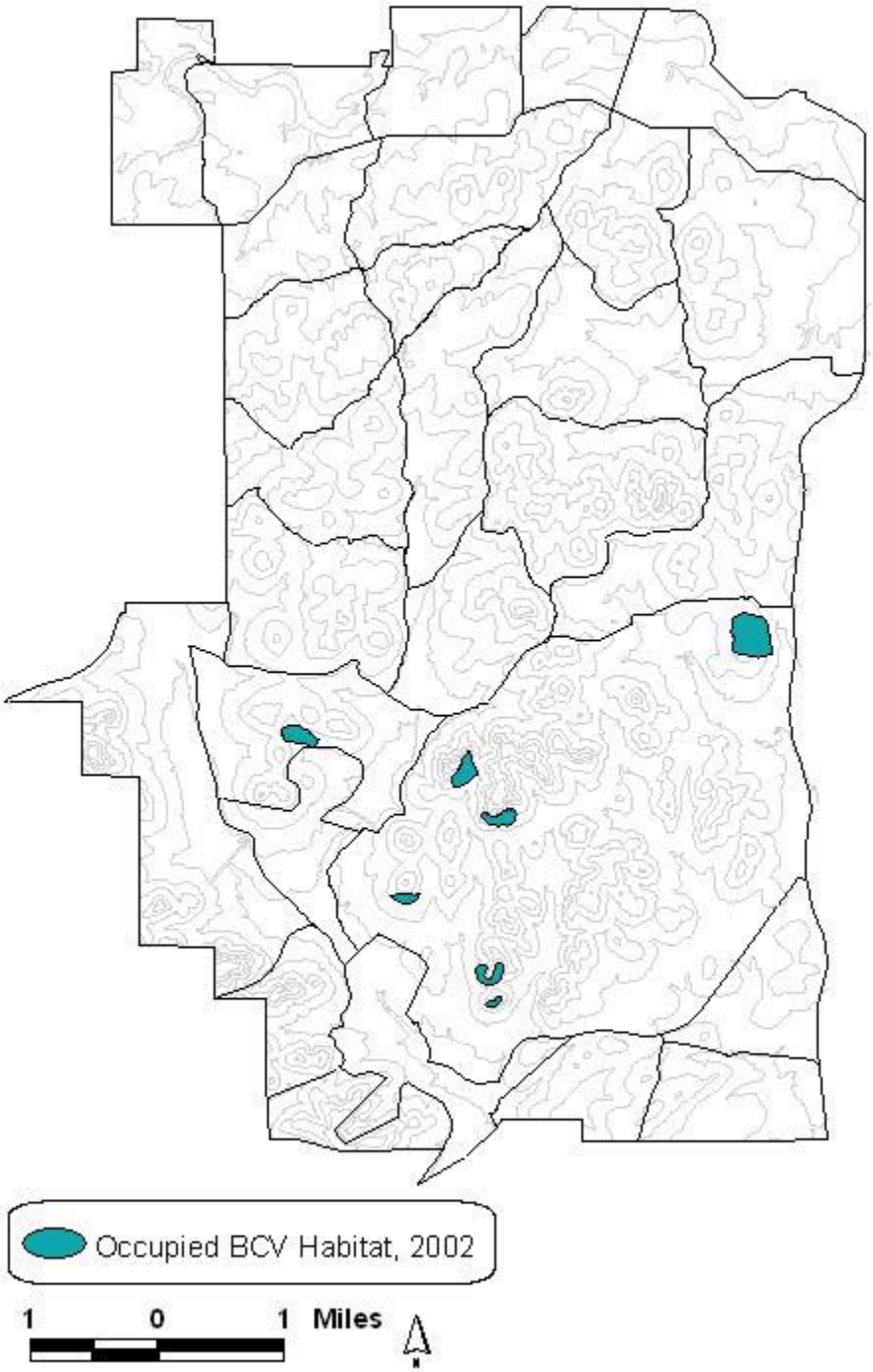
Figure 3.6. Number of Verified BCV Territories, 1989 - 2002



Black-capped Vireo Habitat Analysis:

As previously mentioned, BCVs on Camp Bullis are predominantly found in the MA 9 Impact Area. Of the 129 total observations documented on Camp Bullis during 1989-2002, only 10 to 15 percent were located in areas outside the Impact Area. The history of occupation of sites outside the live-fire area was also more variable relative to sites within the live-fire area. Lack of habitat outside the Impact Area does not fully explain this distribution on Camp Bullis. In 1998, a comprehensive survey of 18 areas of potential BCV habitat outside of MA9 areas was conducted on the installation (Weinberg 1999). Of these, 10 areas were subjectively judged as suitable for BCV occupancy. However, only one of eight BCVs documented in 2001 was observed outside MA9.

Figure 3.7. BCV Habitat on Camp Bullis



3.3 Cave-Adapted Species

Camp Bullis has retained the services of George Veni and Associates for the past ten years to survey for caves and karst features. Surveys have been completed for all of the installation and to date at least 1100 karst features including 78 caves and 1022 karst features have been documented on the installation. Twenty-three (23) caves are known to contain Federally listed invertebrates; of these, 21 have been found to contain *Rhadine exilis,* three contain *Rhadine infernalis ewersi,* and one cave on Camp Bullis contains an endangered spider, Madla's cave meshweaver (*Cicurina madla)* (Veni and Elliott 1994; Veni, *et al.* 1995; Veni 1996,Veni and Assoc. 1998a; Veni and Assoc. 1998b; Veni, *et al.* 1999; Veni and Assoc. 2000; Veni and Assoc. 2002).

In 2002, a management plan entitled "Management Plan for the Conservation of Rare and Endangered Karst Species, Camp Bullis, Bexar and Comal Counties, Texas" (hereinafter referred to as "the karst management plan") was developed (Veni 2002). This plan was reviewed and approved by the USFWS and a Memorandum of Understanding (MOU) between the USFWS and Fort Sam Houston was signed on December 20, 2002. The MOU memorializes the agreement between Fort Sam Houston and the USFWS to protect the Federally listed invertebrate species found on Camp Bullis. In addition, one salamander species and 15 new, or possibly new, invertebrate species known only from Camp Bullis are afforded some protection with this plan.

The karst management plan details specific management activities aimed at ensuring the long-term protection of features containing endangered or otherwise sensitive cave adapted species. That plan is incorporated by reference (Veni, 2002)

The following paragraphs will give a description of cave-adapted species known to occur on Camp Bullis. It should be noted that these sections are brief due to the relatively unknown life requisites of these species. Due to the similar habitat requirements of these three species, habitat descriptions, threats to these species survival, survey methods/population monitoring, and habitat analysis will be discussed collectively. For a more detailed description, please refer to the karst management plan.

Species Accounts:

Madla's cave meshweaver
Scientific Name: *Cicurina madla*
Family: Dictynidae
Current Federal Status: Endangered (55 FR 53153-53160 [26 December 2000]), ESA

Species Description:

Madla's cave meshweaver (*Cicurina madla)* is a small, essentially eyeless, spider known from karst formations in Bexar County, Texas. Madla's cave meshweaver, compared to other *Cicurina* spiders, is small to medium sized, cream colored, eyeless and has relatively long legs. It is only known on Camp Bullis from Headquarters Cave (Veni, *et al*, 1999).

Rhadine exilis and *Rhadine infernalis ewersi* (No Common Name)
Scientific Name: *Rhadine exilis* and *Rhadine infernalis ewersi*
Family: Carabidae
Current Federal Status: Endangered (65 FR 81419 [26 December 2000]), ESA

Species Description:

Rhadine exilis and *Rhadine infernalis ewersi* are small, essentially eyeless, ground beetles that are found in dry caves in Bexar County. *R. exilis* is one of the smallest and most depressed (flattened) members of this genus. *R. infernalis ewersi* is reddish brown, narrow necked and larger than the former species. *R. infernalis ewersi* is only currently known to exist in three caves on one hill mass on Camp Bullis, Texas and no other location worldwide. There is a more common species *R. infernalis* that is located in other locations within Bexar County.

These two endangered ground beetles along with the Madla's cave meshweaver, and their habitats, are threatened by the same factors affecting all the karst dependent species in this area and will benefit by the karst management plan referenced above.

Distribution:

The historic range of Madla's cave meshweaver, *Rhadine exilis,* and *Rhadine infernalis ewersi* is unknown, but likely similar to the current distribution. These species are part of a group of nine endangered species of karst invertebrates that are only known from caves in northern and northwest parts of Bexar County, Texas. This group of nine species includes three beetles, four meshweavers, one spider and one harvestman.

Life History:

These invertebrates are highly adapted to cave environments and very little is known about their life history. These invertebrates have become highly adapted to life in total darkness characterized by very stable temperature, very high, constant humidity, and low food availability. Cave invertebrates generally have few offspring and live relatively long lives. This also means that cave invertebrates are more sensitive to minor changes in the number of individuals and that it takes a long time for their populations to recover from a catastrophe.

Cave invertebrates typically have very low metabolisms to deal with the sparse amount of food in their environment. Food in a cave or karst feature can come indirectly from (1) animals that den in caves and karst features (such as raccoons) and bats which roost in caves and, (2) organic materials like leaves which are washed into the cave or are filtered through the ground above the cave. The droppings from cave inhabitants and the organic matter provide a food source for cave dwelling microorganisms. The microorganisms multiply and become food for other organism such as cave invertebrates.

Habitat Description:

Madla's cave meshweaver, *R. exilis* and *R. infernalis ewersi* are all obligate cave dwelling species found in dry caves in the porous limestone. Parameters of the cave environment include a relatively constant high humidity and stable temperature. These caves receive low energy input from the outside and nutrient availability and moisture are critical limiting factors. *R. exilis* is usually found on moist flowstone in the dark zone of caves. The more robust *R. infernalis ewersi* is found closer to the cave entrances. On Camp Bullis, *R. exilis* was not found in every cave and was not very abundant when found. It seems to require more extensive caves with abundant cave life, especially cave crickets, and prefers high humidity.

Threats to Survival:

Threats to cave-adapted species and their habitats include destruction and/or deterioration of habitat by construction; filling of caves and karst features and loss of permeable cover around caves and karst features. Secondary impacts such as siltation from erosion runoff and contamination from septic effluent, sewer leaks, run-off, pesticides, and other sources also threaten these systems. Predation by and competition with non-native fire ants and vandalism are also threats to these species. Conservation of cave invertebrates is dependent on maintaining a stable environment in the cave or karst feature by maintaining a healthy ecosystem surrounding the area and avoiding alteration of the flow of nutrients and water into the cave.

Distribution and Habitat on Camp Bullis:

Of the 1100 or more karst features on Camp Bullis, to date 23 have been found to contain one or more of these species[4]. Madla's cave meshweaver has only been documented in Headquarters Cave on Camp Bullis. It has also been recorded from seven caves in or near Government Canyon, Helotes, and the University of Texas, San Antonio campus. *R. exilis* is has been found in 21 caves on Camp Bullis and several other caves in north and northwest Bexar County. *R. infernalis ewersi* has only been found in three caves on Camp Bullis - Headwaters Cave, Low Priority Cave, and Flying Buzzworm Cave. Nearly 100 percent of the installation has been surveyed for cave-adapted species and most of the caves that contain these two cave beetles are in the Edwards recharge zone (Veni, 1996).

Survey Methods/Population Monitoring:

As stated above, nearly 100 percent of the installation has been surveyed for cave-adapted species. These surveys are accomplished by a group of surveyors making transects across the area in question. The surveyors space themselves so as to see 100% of the ground between them. Depending on vegetation, this is about 15 meters. Each transect is marked with biodegradable flagging. At the end of each transect, the group moves over and surveys in the opposite direction with the outside person following the line of flagging placed for the preceding transect. In this manner, a 100% survey is accomplished.

[4] Not all features are conducive to habitation, nor have all 1100 features been biologically surveyed.

Populations of cave adapted fauna are monitored through presence/absence surveys. The method used is to collect specimens throughout a cave and identify each to genus and species. Often this requires specimens to be raised in the laboratory to adult to differentiate between species since the difference is only seen in the genitalia of adults. This process is time consuming and does not always produce results. This method also only gives a general idea of the relative abundance of a species and does not determine density.

Camp Bullis is continuing to evaluate these surveys and population monitoring methods for cave-adapted species such as Madla's cave meshweaver and *Rhadine exilis* and *infernalis ewersi*. Camp Bullis will continue surveying, monitoring, and protecting of cave and karst features through cave surveys, geologic assessments, and biological surveys, monitoring, and analysis in accordance with the karst management plan.

Habitat Analysis:

Karst features and caves on Camp Bullis are common in the Edwards limestone and less commonly found in the Glenn Rose Formation (Hubbs 1972). Several species of cave-dwelling invertebrates listed by the USFWS and discussed previously are known to occur in Camp Bullis cave and karst features. These species are adapted to subterranean habitat (troglobite) and spend their entire lives underground. A comprehensive description of cave and karst habitats and associated fauna on Camp Bullis can be found in Veni (1998a). Representative collections of invertebrate fauna were taken from all 78 known caves. In addition to the current list of species known to occur on Camp Bullis, Veni (2002) also documents the collection of several un-described species, which are currently undergoing taxonomic review.

3.4 Other Federal Listed Species

There are six Federally listed T&E bird species that may occasionally use Camp Bullis including the whooping crane, brown pelican, wood stork, bald eagle, piping plover, and least tern (U.S Army 2001a). The whooping crane has been sporadically observed migrating through Camp Bullis in mid-fall and mid-spring following normal migratory patterns. The bald eagle could potentially occur on Camp Bullis. The brown pelican, piping plover, and least tern are unlikely to occur on Camp Bullis. Due to the transitory occurrence of these species and infrequent observance, detailed species accounts will not be presented in this ESMP. General conservation goals and management actions for the transitory Federally listed species are presented in Section 4.6

4.0 ESMP Objectives And Conservation Actions

This chapter identifies goals, objectives, and specific conservation actions Camp Bullis will continue or implement to ensure that this ESMP is effective. Single species management is avoided since more than one listed species or species of concern can and do occupy the same habitat types. This approach is consistent with DoD directives to encourage ecosystem management and maintain biodiversity on DoD lands. Nevertheless, species-oriented goals, objectives, and conservation/protection actions must be identified and implemented.

Realization of the goals and objectives of the ESMP and recommended conservation actions is largely dependent on available funding and personnel resources. Chapter 5.0 identifies the resource requirements for implementation of the ESMP. It is anticipated that the requirements of this ESMP can be implemented with two full time equivalent contract personnel, six seasonal survey workers and an annual operating budget ranging from $1,140,500 to $1,261,000 over the 5-year planning period of this document. It is likely that adequate personnel and funding will be available to accomplish prescribed actions of the ESMP.

4.1 All Federal Listed Species

The following general compliance and protection objectives will assist in implementing and achieving the goals of the ESMP for all Federal listed species.

Compliance Objectives:

Objective A: The Army will continue to comply with all applicable sections of the Endangered Species Act (ESA, 1973, as amended) for all training, operations, maintenance, and construction activities conducted on Camp Bullis; regardless of habitat designation on Training Area maps.

This ESMP does not supersede the legal obligation of the Army and Camp Bullis to comply with Federal law as set forth in the ESA. Camp Bullis will comply with all applicable sections of the ESA for all training, operations, maintenance, and construction activities conducted on Camp Bullis. As required by Section 7 of the ESA, the Army and Camp Bullis will assess the effect of any proposed activity on any listed species or its habitat.

Conservation Actions: Camp Bullis has conducted a Biological Assessment (BA) for the current ongoing mission, and the USFWS has issued a Biological Opinion (BO) that provides conditions for the continuation of mission activities on Camp Bullis. However, any future actions including construction activities or significant changes in training activity will still be subject to Section 7 consultation requirements. Compatible and non-compatible training activities exist and are identified in the ESMP. Subsequently, some areas on Camp Bullis are subject to training restrictions included in the ESMP and shall be designated on Camp Bullis Training Area maps. Areas not subject to training restrictions under this document are still subject to all Section 7 compliance requirements. Any construction project or training activity on Camp Bullis that may result in permanent loss of endangered species habitat will require consultation with USFWS in accordance with Section 7 requirements.

Objective B: Camp Bullis will conduct an annual review/update of the ESMP, as necessary.

Conservation Actions: The FSH Environmental Office staff shall review endangered species monitoring data annually in the fourth quarter of each fiscal year for the prior calendar year. The purpose of this review is to determine if current endangered species management practices require adjustments to achieve the installation's endangered species management goals. An annual status report will be presented to the Camp Bullis Commander, USFWS and the TPWD for consideration in the fourth fiscal quarter. Any accepted changes to endangered species management practices by the installation; USFWS or TPWD will be incorporated as an appendix revision to this ESMP.

Protection Objectives:

Objective A: Continue and increase internal environmental awareness with Integrated Training Area Management to foster protection of T&E species and habitat.

Personnel performing field training must have access to current maps showing designated restricted areas in order to comply with the requirements of this ESMP. The following conservation actions presented to attain this objective will ensure, to the extent possible, that all soldiers, commanders, and other personnel on Camp Bullis have access to current information on the types of training restrictions and the location of restricted areas.

Conservation Actions: Camp Bullis will continue to maintain, update, and distribute Training Area maps that clearly indicate areas such as GCW habitat, BCV habitat, and karst conservation areas that are subject to Camp Bullis Endangered Species Training Guidelines (Appendix C). The guidelines identify compatible and non-compatible training activities within identified habitat. Training Area maps will be revised to remain current with the training restrictions in this and subsequent ESMPs. As personnel and funding allow, signage will be placed in the field to mark the boundaries of the training restricted areas.

Revised Training Area maps will be issued or made available to all installation commands and training support elements. Training Area maps will be reviewed and revised, if necessary, as needed or annually. Earlier editions of the maps will be collected and destroyed to the extent possible. The revised maps will be incorporated into future revisions of the ESMP and will contain information on any changes to training restrictions.

Advising troops of their natural resource stewardship responsibilities is the duty of the ITAM office in conjunction with the Environmental Office. Subject to the availability of funds, the ITAM office will prepare and make available Leader's Handbooks and Environmental Field Guides for distribution to all officers and Senior Non Commissioned Officers (NCO) who are stationed or train at Camp Bullis. The ITAM office will also develop informative briefings on natural resource requirements, to include those of endangered species, which can be presented in annual and/or monthly training sessions and to visiting units on an as-need basis.

Objective B: Develop external partnerships to enhance the management of T&E species.

Ongoing commercial and residential development around the installation will likely increase Camp Bullis' focus on T&E species recovery. 10 USC 2684a authorizes the Military to enter in to agreements with outside entities to preserve habitat in a manner that may eliminate or relieve current

or anticipated environmental restrictions that would or might otherwise restrict, impede, or otherwise interfere, whether directly or indirectly, with current or anticipated military training, testing, or operations on the installation. Establishing external partnerships will help to protect habitat for individual species and possibly connect discontinuous habitat, thereby fostering DoD's and Camp Bullis' goal of ecosystem management.

Conservation Actions: Camp Bullis will evaluate the potential for entering into a partnership with the City of San Antonio, TPWD, USFWS, USGS, NRCS, Camp Stanley, Universities, and other relevant parties to protect endangered cave invertebrates; to establish undeveloped, contiguous protected corridors for the GCW and BCV that extend beyond the installation boundaries; and to protect endangered cave invertebrates.

Currently, Camp Bullis, together with Texas A&M, the Edwards Aquifer Authority, the San Antonio Water System, the University of Minnesota, George Veni and Associates, and Duke University, is planning to implement a feasibility study on augmenting groundwater recharge through cedar control on Camp Bullis. This study will concentrate on two-three caves on Camp Bullis – Headquarters Cave, Bunnyhole Cave, and/or B-52 cave, two of which, Headquarters Cave and Bunnyhole Cave, are in GCW habitat. Water seepage into the caves will be monitored and a rainfall simulator will allow the control of the timing and amount of water. A tracer, added to the water, will be applied to a well-instrumented site that is above a cave. The surface instrumentation would quantify rainfall rates, surface runoff, interflow runoff, stem flow, throughfall and canopy interception for both natural and simulated rainfall events. The cave monitoring would provide a direct measurement of recharge for both natural and simulated rainfall events and allow researchers to complete the water budget. After a solid relationship between the seepage rate and precipitation has been established, researchers will remove the overlying cedar cover and determine the extent to which seepage rates change.

Objective C: Implement ESMP enforcement measures.

Conservation Actions: The training restrictions, habitat boundaries, and other requirements of this ESMP, upon approval by the commander, will be incorporated into the Camp Bullis Training Regulation AMEDDC&S & FSH Reg 350-2 at its next revision. This action will facilitate military command and control of the environmental requirements of the ESMP and will result in the highest achievable level of compliance. This action will further allow the enforcement capabilities of the installation military police to enforce environmental and endangered species compliance requirements of this plan.

4.2 Golden-cheeked Warbler

Monitoring Objective:

Objective A: Continue to document GCW population trends and monitor population status.

Population change is the base-line measure of conservation success and recovery for the population. This measure is necessary to differentiate between normal annual variability and true trends in populations over time. Also, this will document effects of land use practices, including military training, and management actions on GCW populations. To achieve this goal, Camp Bullis will implement the following conservation actions:

Conservation Actions:

1) Conduct annual point count censuses to obtain numbers of birds detected per location. Determine numbers of singing males within occupied habitat areas annually and record dominant vegetation within the delineated breeding territories (continue to conduct demographic surveys of approximately 20 breeding territories per year).

2) Record presence or absence of a female on each male territory.

3) For all nests located within territories, record the number of nestlings, fledglings, and nest fate.

These measures are necessary to evaluate effects of management actions and military training on GCWs. The Camp Bullis Environmental Office will schedule access to the training areas through Range Control.

Mapping Objective:

Objective A: Produce an annual habitat map, based on prior field season results, delineating "core" vs. "non-core" habitat.

Based on data collected since 1991, the primary areas of concentration for GCW on Camp Bullis occur in the following subpopulation complexes; 1) Bullis Hills, 2) Lewis Creek, and 3) Cibolo Creek. Most of the GCW habitat on Camp Bullis appears to meet the breeding territory needs of the species in its current condition and does not need modification or additional types of management, other than protection from disturbances.

According to the most recent survey data, Camp Bullis has an estimated 7,470 ac (3,024 ha) of GCW habitat (Performance Group, Inc. 2002). This GCW habitat is divided into "core" and "non-core." "Core" habitat is habitat that has been occupied during the past 3 consecutive years and is delineated by placing a 10 acre circle around each bird location[5]. The 2002 Habitat map includes 3,478 ac (1,404ha) of Core Habitat (Figure 4.1).

"Non-core" is all other habitat that has been historically occupied, but has not been shown to be occupied within the past 3 consecutive years. The designation of habitat as "core" or "non-core" will be reassessed each year after the field season results are finalized. Designation of areas as "non-core" habitat is based solely on no occupation by GCW within the past 3 consecutive years and does not imply any qualitative difference between "core" and "non-core" habitat with regard to suitability as golden-cheeked warbler habitat.

Conservation Actions: "Core" habitat will be subject to all training restrictions as described in Table 4.1, *Training Restrictions Within GCW "Core" Habitat*. "Non-core" habitat areas will remain subject to all applicable Camp Bullis range regulations, in particular, regulations governing activities that could result in permanent alteration to endangered species habitat, but it will not be subject to training restrictions imposed on "core" habitat. An example would be the requirement to submit for approval an Excavation Permit prior to initiating any excavation activities in core habitat. An Excavation Permit will not be required for any excavation activities in non-core habitat.

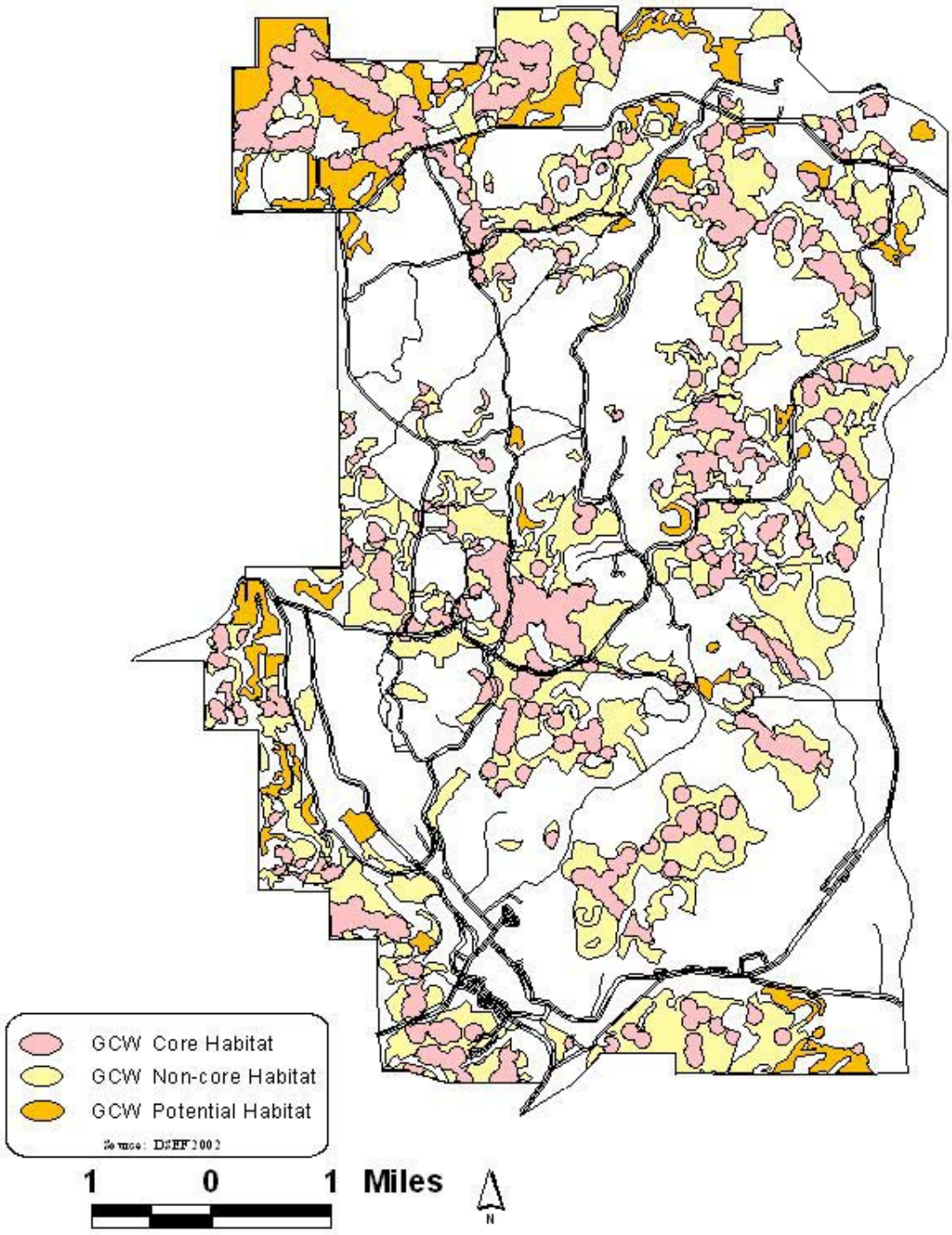
[5] This acreage was deemed to be adequate to protect the territory and to provide an additional buffer.

It should be stressed that the designation of habitat as "core" or "non-core" will not result in the destruction of non-core habitat, but will only serve to better define where training and other restrictions are enforced. There will be no restrictions to training in "non-core" habitat and vegetation management will be limited to that necessary for maintenance of training facilities, roads, fire-breaks and other administrative facilities. There will also be no wholesale removal of vegetation in areas designated as "non-core" since it is possible that non-core habitat could become occupied at a later date. For this reason, surveys will continue in these areas. If non-core does become occupied, then it will be designated as core habitat and marked accordingly on the maps.

Accidental fires occur on Camp Bullis in most years. Since 1995 approximately 747 acres have burned for an average of 107 acres per year. These fires were usually associated with the range impact area and caused by tracer ammunition and pyrotechnics. While some areas tend to burn annually, most burn only after fuel has increased sufficiently to carry a fire–every ten to thirty years.

To minimize possible negative impacts, MA 9 has been divided into smaller units enclosed by fire breaks. These fire breaks are maintained on a regular basis and prevent the spread of an accidental fire to large areas of habitat. In addition, where feasible any accidental fires occurring in or near habitat are aggressively fought.

Figure 4.1. Golden-cheeked Warbler Core, Non-core and Potential Habitat, Camp Bullis.



Population Objective:

Objective A: Maintain sufficient habitat to support a minimum carrying capacity equal to the historic average installation-wide density of 7 singing males per 100 ha of habitat and strive to continue the trend of increasing GCWs on Camp Bullis.

Currently, Camp Bullis supports approximately 117 breeding male GCWs in the core habitat. This population estimate was achieved by multiplying the mean recorded historical GCW breeding density on the installation (2.9 adult males per 100 ac (7.2 adult males per 100 ha)) times the "core" habitat acreage (4,029 ac (1,631 ha)).

Conservation Actions: Camp Bullis will implement designation of existing GCW habitat into "core" and "non-core" habitat areas as defined in 4.2.2 (Figure 4.1). "Core" habitat, as discussed, is defined as a 10-ac (4-ha) zone around GCW locations that have been occupied in the last three consecutive years. Using these factors, of the 7,470 ac (3,024 ha) of GCW habitat on Camp Bullis, 3,478 ac (1,404ha) is designated as "core" habitat. In addition, each area will have a 328-foot (100-m) noise buffer areas surrounding them. "Non-core" habitat is the remaining area of historically occupied habitat on Camp Bullis (3441 ac (1,393 ha)) and the range impact area. Due to the parameters by which "core", "non-core", and associated noise buffers are determined, the maps will be updated and revised every year. The goals of creating "core" habitat with noise buffers are (1) to identify areas where non-compatible training activities are restricted and (2) to provide contiguous areas for management of the current population of GCWs.

Table 4.1. Training Restrictions Within GCW "Core" Habitat

LEVEL 1 RESTRICTIONS: NON-BREEDING SEASON (*1 August to 28 February*)
Restrictions Within GCW "Core" Habitat
1. Training units may occupy and utilize "core" habitat for training. Use only existing roads and trails – park equipment in open areas only.
2. No vegetation removal, including brush/juniper removal.
Restrictions Within 100-meter Buffer Areas Around GCW "Core" Habitat
No restrictions
LEVEL 2 RESTRICTIONS: BREEDING SEASON (*1 March to 31 July*)
RESTRICTIONS WITHIN GCW "CORE" HABITAT
1. Training units may pass through area using only existing roads and trails *or emergency stop only.* Park equipment in open areas only & no long-term parking. *Long-term is defined as equipment parked and running longer than 2 hours in duration.*
2. No establishment of bivouacs or other static positions, including temporary fueling areas, decontamination areas and field medical operations.
3. No vegetation removal, including brush/juniper removal.
4. No use of pyrotechnics or controlled burns for brush management.
5. No off-road vehicle use for maintenance or military maneuver.
6. No use of obscurant smoke, other chemical agents, or lighted nighttime activities.
RESTRICTIONS WITHIN 100-METER BUFFER AREAS AROUND GCW "CORE" HABITAT
1. No long-term use of noise-producing equipment (e.g., generators).
2. No use of obscurant smoke or other chemical agents.
3. Vegetation removal, including brush/juniper removal, only by hand.

Protection Objective:

Objective A: Implement training restrictions in "core" GCW habitat and noise buffer areas in accordance with Camp Bullis Endangered Species Training Guidelines (Appendix C);

The 3,478 ac (1,404 ha) designated as "core" GCW habitat protected under the Camp Bullis Endangered Species Training Guidelines represent approximately 45 percent of the current estimate of GCW historically occupied habitat (estimated 7470 ac (3024 ha) in 2002) on Camp Bullis (see Figure 4.1). Some types of military training in areas occupied by GCWs can destroy habitat and disturb nesting, potentially resulting in reduced abundance and productivity, and are thereby deemed non-compatible within "core" habitat. These impacts increase the possibility of "take" as defined in the ESA. Implementation of the Camp Bullis Training Guidelines in the areas designated in this plan

would avoid "take" of any GCW habitat due to military training activities or construction and meet management goals under this ESMP.

Conservation Actions: Certain restrictions to non-compatible military training practices described in this ESMP shall be imposed to insure the continued productivity and survival of GCW within the "core" habitat. Adequate "core" and "non-core" GCW habitat is available on Camp Bullis that does not require intensive management other than protection. Compatible training practices within designated "core" habitat can occur in accordance with the schedule and restrictions presented in Table 3. Training practices within 328 feet (100 m) of designated "core" habitat or other signed breeding areas are also subject to the listed restrictions (Table 4.1).

Objective B: Continue training without restrictions consistent with essential mission requirements in designated "non-core" habitats while providing no habitat loss.

The 3,478ac (1,404 ha) of "non-core" habitat will be designated to accommodate essential mission training activities and does not imply any qualitative difference between "core" and "non-core" habitat with regard to suitability as GCW habitat. Designation of GCW habitat as "core" or "non-core" is related only to compatible and non-compatible training activities allowed under these respective designations.

Conservation Actions: Training restrictions specified in Table 4.1 will be rescinded for the 3,478 ac (1,404 ha) of "non-core" GCW habitat identified previously in Figure 4.1. The Camp Bullis Environmental Office will maintain records and maps of all areas occupied by endangered species including the GCW. All will be allowed in "non-core" habitat. However, "non-core" habitat areas will remain subject to all other applicable Camp Bullis range regulations, in particular, regulations governing activities that could result in permanent alteration to vegetation.

Objective C: Minimize incidental take for the 5-year term of this ESMP.

The intent of this ESMP is to promote recovery of endangered species on Camp Bullis while permitting the military maximum flexibility to perform mission essential tasks. Establishing incidental take limits provide flexibility for conducting mission activities that may result in habitat loss. However, this potential habitat loss will be minimized through implementation of this ESMP so as not to imperil the installation's GCW management goals.

Habitat loss as defined under this ESMP is any permanent or temporary alteration of currently occupied habitat to the extent that it is unsuitable for occupation by breeding adults. This would include wildland fire, brush clearing and other activities. Incidental take limits are established by considering take of this type for the 10 year period preceding the implementation of this ESMP. The Incidental Take limits described in the Biological Assessment of this ESMP and associated mitigation requirements for habitat loss exceeding incidental take limits provide Camp Bullis an incentive to carefully consider any permanent alteration or excessive loss of endangered species habitat.
Of the 7,470 ac (3,023 ha) of GCW historically occupied habitat on Camp Bullis, 3,478 ac (1,404 ha) is currently designated as "core" GCW habitat. This habitat is protected under the Camp Bullis Endangered Species Training Guidelines and is subject to the incidental take limits and mitigation requirements. The remaining 4,061 ac (1,499 ha) is designated as "non-core" GCW habitat and is not subject to the training restrictions applied to core habitat or the incidental take limits. However, it is

protected from any activities such as brush clearing that could result in permanent alteration to the habitat.

Conservation Actions: Camp Bullis will implement the incidental take limits designated in the Biological Assessment during the 5-year term of this ESMP. Incidental take provided under this ESMP will include military activities associated with transient training activities, loss due to accidental burns, and any other activities in "core" habitat. As long as habitat loss remains within incidental take limits, no additional protective measures are required. However, if the incidental take is exceeded, then Section 7 consultation will be required and "non-core" habitat will be used to meet the ESMP carrying capacity objectives by acting as a mitigation bank for habitat loss. Proposed projects, land use actions, and/or training actions that will permanently alter endangered species habitats are subject to further requirements of the ESA. Therefore, this incidental take will not apply to such actions. These activities will require Camp Bullis to initiate Section 7 consultation with the USFWS prior to implementation.

Camp Bullis currently provides sufficient habitat to meet carrying capacity goals as defined in this ESMP (Section 4.2.3). The installation will maintain currently available habitat by avoiding any habitat disturbing activities due to training or other project actions consistent with mission requirements. Normally, complying with the provisions of this ESMP will meet this objective. Any habitat loss, including loss considered incidental take, will be reported on an annual basis to the installation Commander and to the USFWS as part of the installation's annual reporting requirement.

Management Objectives:

Objective A: Maintain and proactively manage GCW habitat consistent with carrying capacity goal and essential mission requirements.

Camp Bullis currently provides sufficient habitat to meet carrying capacity goals under this ESMP. Maintenance of this habitat in accordance with USFWS recovery goals will promote the long-term survival of the species.

Conservation Actions: Camp Bullis will maintain currently available habitat by implementing the Endangered Species Training Guidelines. Complying with these guidelines will avoid habitat disturbance due to training or other military actions consistent with mission requirements. Camp Bullis will also strive to increase contiguous suitable habitat for GCW by allowing the oak-juniper ecosystem to mature in appropriate areas. For example, during Phase 3 and 4 (1999 and 2000) of the TCA program, the installation delineated and excluded from clearing an area of existing and potentially suitable vegetation on the northeastern perimeter of the installation along Cibolo Creek. Over time, this will help to produce a contiguous corridor of quality GCW habitat along Cibolo Creek. The vegetation along the southwestern perimeter and other appropriate areas will also be evaluated for similar expansion of GCW habitat. Camp Bullis will continue and expand the TCA program, prescribed burning, and other ecosystem management practices to promote species diversity.

Research Objectives:

Objective A: Evaluate correlation of habitat quality with golden-cheeked warbler abundance and productivity.

Conservation Actions: Camp Bullis will continue to evaluate the correlation of habitat quality with GCW abundance and productivity. This information is necessary to validate population goals and mitigation areas for the installation. The installation will conduct GCW surveys in accordance with USFWS protocol within areas deemed as potential habitat. Such surveys will assist Camp Bullis land managers in defining suitable/non-suitable habitat. The recently completed NRCS vegetation survey should also be considered when choosing potential habitat to survey and evaluate. This information can be used to predict areas to monitor in following years. As time permits, in accordance with USFWS protocol, Camp Bullis staff shall visit all known or suspected potential GCW habitat to enhance documentation of GCW distribution on Camp Bullis. Camp Bullis will also utilize the GCW research and monitoring results to refine estimates of carrying capacity for GCW on Camp Bullis.

Camp Bullis will continue to evaluate threat of oak wilt to GCW habitats and determine priority threats from oak wilt. Based on this priority ranking, Camp Bullis shall implement appropriate treatment and/or isolation methods to reduce oak-wilt threat to GCW habitats.

Objective B: *Continue to study the potential impacts of military training on GCW and measures to reduce potential impacts.*

Camp Bullis shall continue the study and implementation of the TCA program. Camp Bullis will also document the effect of implementing the Endangered Species Training Guidelines and determine if past causes of incidental take (e.g., GCW habitat disturbance) can be prevented. Camp Bullis will proactively investigate the potential impacts of current and future military training activities on GCW (e.g., noise study) and study methods to reduce impacts.

4.3 Black-capped Vireo

Monitoring Objective:

Objective A: Continue to document black-capped vireo population trend.

Population change is the base-line measure of conservation success and recovery for the population. This measure is necessary to differentiate between normal annual variability and true trends in populations over time. Also, this effort will document effects of land use practices, including military training restrictions, and management actions on BCV populations. To achieve this goal, Camp Bullis will continue and/or implement the following conservation actions:

Conservation Actions:

1) Determine numbers of singing males within habitat annually and record dominant vegetation characteristics within the breeding territories.

2) Annually visit and inspect all suspected sites of BCV occupation to document status and physical location of BCV on Camp Bullis.

3) Ensure complete access to impact area in order to adequately survey BCV status and physical location.

Objective B: Continue to monitor and assess population status by monitoring demographic parameters.

Monitoring certain demographic parameters will assist Camp Bullis' land managers and cooperating agencies such as the USFWS evaluate the effects of management actions and recommendations of the ESMP. Demographic monitoring will also assist in evaluating the effects of land use practices and implementation of the endangered species management guidelines and related training restrictions within bcv habitat.

Conservation Actions: for at least 50 percent of the BCV territories known to exist on Camp Bullis in a given year, the following parameters should be documented annually:

Record presence or absence of a female within each male territory.

1) Document territory size.

2) Document number of young with each adult.

3) For all nests located, record number of host and parasite eggs, nestlings, fledglings, and nest fate.

These measures are necessary to evaluate effects of management actions and military training, on BCVs.

Population Objective:

Objective A: *Maintain sufficient habitat to maintain carrying capacity of 11 BCV territories.*

Camp Bullis has historically supported up to 18 documented BCV territories annually (U.S. Army 2002) with the historic average of approximately 11 territories (range 6 – 18) reported from 1989—2002. Currently, Camp Bullis supports up to eighteen male BCV in eighteen territories (Performance Group, Inc. 2002), although the numbers fluctuate from year to year and was as low as six males in 1996.

The BCV population on Camp Bullis has historically been low primarily its location at the extreme southeastern extent of BCV's range and the lack of suitable habitat (Performance Group, Inc. 2001). Historically, approximately 229 ac (93 ha) of BCV habitat has been documented on Camp Bullis within the following maneuver areas (MA): (1) MA 9, 150 ac (61 ha), (2) MA 7, 20 ac (8.1 ha), (3) MA 4B and 5D, 40 ac (16 ha), and (4) MA 6A, 19 ac (8 ha). The remainder of Camp Bullis with potential soils and geologic substrate for BCV habitat suffers from low fire cycle frequency sufficient to produce habitat suitable for BCV occupation. Currently, BCV habitat on Camp Bullis encompasses about 152 acres (61.5 ha) and is located primarily within MA 6A and MA9 (Figure 3.6) (Performance Group, Inc. 2001).

Conservation Actions: Camp Bullis designates all current BCV habitat throughout the installation as BCV protected habitat. The goals of designating the BCV protected habitat are (1) to identify areas that are distant from intrusive activities and conducive to expansion of existing BCV habitat and (2) to

develop these areas into a contiguous area for proactive management of the current population of BCV breeding males.

Camp Bullis will focus future BCV habitat management efforts within MA 9 with the goal to maintain and expand the current BCV habitat. At the same time, early successional vegetation and thereby potential BCV habitat, may be incidentally created/improved by wildfires, prescribed burns, and mechanical clearing of mature vegetation. Future revisions of this ESMP will document habitat changes over time.

Table 4.2. Training Restrictions Within BCV Habitat.

LEVEL 1 RESTRICTIONS: NON-BREEDING SEASON *(1 September to 31 March*)
RESTRICTIONS WITHIN BCV HABITAT
1. Training units may occupy and utilize habitat for training activities. Use only existing roads and trails – park equipment in open areas only.
2. No vegetation removal, including brush/juniper removal.
LEVEL 2 RESTRICTIONS: BREEDING SEASON (*1 April to 31 August*)
RESTRICTIONS WITHIN BCV HABITAT
1. Training units may pass through area using only existing roads and trails *or emergency stop only*. Park equipment in open areas only & no long-term parking. *Long-term is defined as equipment parked and running longer than 2 hours in duration.*
2. No establishment of bivouacs or other static positions, including temporary fueling areas, decontamination areas and field medical operations.
3. No vegetation removal, including brush/juniper removal.
4. No use of obscurant smoke, other chemical agents, or lighted nighttime activities.

Protection Objective:

Objective A: Implement training restrictions in all current BCV habitat in accordance with Camp Bullis Endangered Species Training Guidelines (Table 4.2) to prevent habitat loss.

Habitat loss as defined under this ESMP is any permanent or temporary alteration of currently occupied habitat to the extent that it is unsuitable for occupation by breeding adults. This may be due to military training, construction, wildfires, or natural succession of vegetation. Some level of mechanical disturbance due to military training may help maintain habitat in seral stages suitable for BCV occupation. However, most types of military training in areas occupied by BCVs destroy habitat and disturb nesting, potentially resulting in reduced abundance and productivity, and are thereby deemed non-compatible within habitat. These impacts increase the possibility of "take" as defined in the ESA. Implementation of the Camp Bullis Endangered Species Training Guidelines in the protected areas designated in this plan would avoid take of BCVs and BCV habitats due to military training activities and meets management goals under this ESMP.

Conservation Actions: This ESMP implements restrictions on military training to insure the continued productivity, survival and expansion of the current habitat areas (Table 4.2). The training restrictions for BCV habitat are in accordance with the Camp Bullis Endangered Species Habitat Training Guidelines. These restrictions will also apply to future BCV habitat within MA 9, as well as future BCV habitat installation-wide.

Objective B: *Minimize incidental take for the 5-year term of this ESMP.*

The intent of this ESMP is to promote recovery of endangered species on Camp Bullis while permitting the military maximum flexibility to perform mission essential tasks. Establishing incidental take limits provide flexibility for conducting mission activities that may result in habitat loss. However, this potential habitat loss will be minimized through implementation of this ESMP so as not to imperil the installation's BCV management goals.

Habitat loss as defined under this ESMP is any permanent or temporary alteration of currently occupied habitat to the extent that it is unsuitable for occupation by breeding adults. This would include wildland fire, brush clearing and other activities. Incidental take limits are established by considering take of this type for the 10 year period preceding the implementation of this ESMP. The Incidental Take limits described in the Biological Assessment of this ESMP and associated mitigation requirements for habitat loss exceeding incidental take limits provide Camp Bullis an incentive to carefully consider any permanent alteration or excessive loss of endangered species habitat.

Conservation Actions: Camp Bullis will implement the incidental take limits designated in the Biological Assessment during the 5-year term of this ESMP. Incidental take provided under this ESMP will include military activities associated with transient training activities, loss due to accidental burns, and any other activities in "core" habitat. As long as habitat loss remains within incidental take limits, no additional protective measures are required. However, if the incidental take is exceeded, then Section 7 consultation will be required and "non-core" habitat will be used to meet the ESMP carrying capacity objectives by acting as a mitigation bank for habitat loss. Proposed projects, land use actions, and/or training actions that will permanently alter endangered species habitats are subject to further requirements of the ESA. Therefore, this incidental take will not apply to such actions. These activities will require Camp Bullis to initiate Section 7 consultation with the USFWS prior to implementation.

Camp Bullis currently provides sufficient habitat to meet carrying capacity goals as defined in this ESMP (Section 4.2.3). The installation will maintain currently available habitat by avoiding any habitat disturbing activities due to training or other project actions consistent with mission requirements. Normally, complying with the provisions of this ESMP will meet this objective. Any habitat loss, including loss considered incidental take, will be reported on an annual basis to the installation Commander and to the USFWS as part of the installation's annual reporting requirement.

Objective B: *Continue training without restrictions consistent with essential mission requirements in areas outside of BCV habitat while providing no habitat loss.*

The 152 ac (62 ha) designated as protected BCV habitat areas under the Camp Bullis Endangered Species Training Guidelines represents 100 percent of the current estimate of BCV habitat on Camp Bullis and 66 percent of the historically occupied habitat identified on Camp Bullis. Habitat loss as defined under this ESMP is any permanent or temporary alteration of currently occupied habitat to the extent that it is unsuitable for occupation by breeding adults. This may include loss due to military training, wildfires, or natural succession of vegetation.

Conservation Actions: Camp Bullis will continue normal training activities in potential BCV and other non-restricted habitat in accordance with normal range safety and environmental restrictions (Table 3). If future BCV incidental take provisions are warranted and incorporated into the ESMP, the provisions will be limited to those military activities associated with training activities and loss due to

uncontrolled burns in all habitat areas. Proposed projects and land use actions that will permanently alter BCV habitats are subject to Section 7 requirements of the ESA and as such will require consultation with USFWS.

Management Objectives:

Objective A: Maintain sufficient habitat in seral stage suitable to continue to meet historic maximum population levels.

Typically, BCVs are observed in early successional habitat resulting from burns or mechanical clearing of vegetation in areas with suitable soils and geologic substrate. About 152 ac (62 ha) have been identified on Camp Bullis as currently occupied habitat. Any restoration activities implemented by Camp Bullis should first be implemented in areas historically occupied but where current vegetation has succeeded beyond the seral stage preferred by BCVs. This main purpose of this objective is to maintain and expand the current level of managed BCV habitat on Camp Bullis with the anticipation that properly managed habitat will become occupied by BCV.

Conservation Actions: Camp Bullis land managers should implement habitat restoration to maintain and expand habitat in the desired seral stage (typically 5-15 years post-disturbance) where practicable to ensure that suitable habitat is maintained.

Camp Bullis will develop and submit to USFWS for review and approval, a BCV habitat restoration plan for incorporation in subsequent ESMP revisions. This habitat restoration plan will be guided by observed vegetation conditions, soils, geology, BCV occupancy, training requirements and expert opinion. Habitat restoration should target areas exceeding the preferred seral stage (typically >5-15 years post-disturbance).

Research Objectives:

Objective A: Correlate annual population surveys, where accessible, in occupied and potential habitat with environmental factors to better define habitat for black-capped vireos.

As part of the management objectives of the ESMP, Camp Bullis will develop and submit to USFWS for review and approval a BCV habitat restoration plan for incorporation in subsequent ESMP revisions. The BCV annual population survey results should be incorporated into the BCV habitat restoration plan.

Conservation Actions: Camp Bullis will conduct annual population surveys, where accessible, and also quantify soils, geologic substrate, and vegetation conditions associated with habitat. A summary report should correlate BCV occupation with environmental factors and identify areas of historically occupied habitat with high potential for conversion to suitable seral stage. This will allow Camp Bullis land managers to focus management efforts and establish early successional stage habitat in high priority areas.

4.4 Cave-Adapted Species

Three Federally listed cave adapted species have been found on Camp Bullis to date. These are *Cicurina madla* (Madla cave meshweaver), *Rhadine exilis*, and R. *infernalis ewersi*. A complete

discussion of cave ecosystems and their management on Camp Bullis can be found in the "Management Plan for the Conservation of Rare and Endangered Karst Species, Camp Bullis, Bexar and Comal Counties, Texas." (Veni and Assoc. 2002) and is incorporated herein by reference.

4.5 Other Species

The ESA requires protection from harassment for all Federal listed species. The whooping crane and bald eagle could be observed on the installation during migration for only short periods of time. Therefore, no specific protection plan seems warranted at this time. However, if these species are observed, certain protection measures and monitoring would be warranted to guard against potential impacts associated with the military mission. If whooping cranes, bald eagles or peregrine falcons are observed, range control will protect these species from potential disturbance by military training and other land use activities by adhering to the following objectives:

Monitoring Objective:

Continue to monitor and document the presence and status of other listed rare and sensitive species.

Conservation Actions:

1) Monitor any whooping cranes, bald eagles or other listed species that appear on Camp Bullis for potential disturbance from human activity and notify USFWS.

2) Conduct additional surveys to determine presence and status of other listed rare and sensitive species.

3) Revise ESMP if repeated sightings of any additional species occur.

Protection Objectives:

Provide and implement protection measures to minimize potential disturbance, harassment, or other impacts to species of concern from military training and other land use activities.

Conservation Actions:

1. Notify range control and other appropriate organizational elements of any potential training conflicts associated with the location of the observed listed species.

2. Suspend training activities in proximity to these species until they have departed installation lands.

5.0 Resource Requirements

This section provides an estimate of the required resources to conduct the Camp Bullis endangered species research and management for FY 05 through 09 as described in this ESMP. Estimates are organized by fiscal year and include personnel costs where applicable. These estimates do not include the two full time equivalent positions required for on-site, daily management. Expenditures are subject to the availability of funds.

Table 5.1. Projected Resource Requirements for the Period of the ESMP.

FY	Major Activity or Cost Category	Cost Estimate ($)
2005	Program management	50,000
	Golden-cheeked warbler research and habitat management	50,000
	Black-capped vireo research and habitat management	50,000
	Forest mgt., firebreaks, and prescribed burning	15,000
	Fire control equipment and support	5,000
	Caves and cave fauna monitoring and research	225,000
	Species surveys and biological assessments	250,000
	Mitigation/Research	500,000
	FY05 Total	1,140,500
2006	Program management	50,000
	Golden-cheeked warbler research and habitat management	50,000
	Black-capped vireo research and habitat management	50,000
	Forest mgt., firebreaks, and prescribed burning	15,000
	Fire control equipment and support	5,000
	Caves and cave fauna monitoring and research	230,000
	Species surveys and biological assessments	250,000
	Habitat Delineation- Signing and Mapping	10,000
	Mitigation/Research	500,000
	FY06 Total	1,160,000
2007	Program management	60,000
	Golden-cheeked warbler research and habitat management	70,000
	Black-capped vireo research and habitat management	50,000
	Forest mgt., firebreaks, and prescribed burning	15,000
	Fire control equipment and support	5,000
	Caves and cave fauna monitoring and research	235,000
	Species surveys and biological assessments	300,000
	Habitat Delineation – Signing and Mapping	1,000
	Mitigation/Research	500,000

FY	Major Activity or Cost Category	Cost Estimate ($)
	FY07 Total	1,236,000
2008	Program management	70,000
	Golden-cheeked warbler research and habitat management	70,000
	Black-capped vireo research and habitat management	60,000
	Forest mgt., firebreaks, and prescribed burning	15,000
	Fire control equipment and support	5,000
	Caves and cave fauna monitoring and research	240,000
	Species surveys and biological assessments	300,000
	Habitat Delineation – Signing and Mapping	1,000
	Mitigation/Research	500,000
	FY08 Total	1,261,000
2009	Program management	70,000
	Golden-cheeked warbler research and habitat management	70,000
	Black-capped vireo research and habitat management	60,000
	Forest mgt., firebreaks, and prescribed burning	15,000
	Fire control equipment and support	5,000
	Caves and cave fauna monitoring and research	240,000
	Species surveys and biological assessments	300,000
	Habitat Delineation – Signing and Mapping	1,000
	Mitigation/Research	500,000
	FY09Total	1,261000
	Grand Total: $6,058,500	

6.0 Checklist

Table 6.1. Activity, reporting, and compliance checklist for the Camp Bullis Endangered Species Management Plan.

Schedule	Activities	Implemented	
		Date	Signature
FY2005	GCW field research and monitoring		
	BCV field research and monitoring		
	Caves research and monitoring		
	Annual status report submitted to USFWS		
	Annual up-date of restricted area map		
	Annual Training Forum		
	Review of ESMP		
FY2006	GCW field research and monitoring		
	BCV field research and monitoring		
	Caves research and monitoring		
	Annual status report submitted to USFWS		
	Annual up-date of restricted area map		
	Annual Training Forum		
	Review of ESMP		
FY2007	GCW field research and monitoring		
	BCV field research and monitoring		
	Caves research and monitoring		
	Annual status report submitted to USFWS		
	Annual up-date of restricted area map		
	Annual Training Forum		
	Review of ESMP		

Schedule	Activities	Implemented	
		Date	Signature
FY2008	GCW field research and monitoring		
	BCV field research and monitoring		
	Cave research and monitoring		
	Annual status report submitted to USFWS		
	Annual up-date of restricted area map		
	Annual Training Forum		
	Review of ESMP		
FY2009	GCW field research and monitoring		
	BCV field research and monitoring		
	Cave research and monitoring		
	Annual status report submitted to USFWS		
	Annual up-date of restricted area map		
	Annual Training Forum		
	Review of ESMP		
	Complete major revision of ESMP		

7.0 References

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8.0 List Of Preparers

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9.0 List Of Acronyms and Abbreviations

ac	Acre
AEC	Army Environmental Center
AHS	Academy of Health Sciences
AMEDDC&S	Army Medical Department Center and School
AR	Army Regulation
BA	Biological Assessment
BCV	Black-capped Vireo
BN	Battalion
CALS	Combat Assault Landing Strip
CAMS	Continuous Air Monitor Sampler
CCC	Civilian Conservation Corps
DMRTI	Defense Medical Readiness Training Institute
DoD	Department of Defense
DOE	Department of Energy
DPTMS	Directorate of Plans, Training and Security
DZ	Drop Zone
EA	Environmental Assessment
EOD	Explosive Ordinance Demolition
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESMP	Endangered Species Management Plan
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FORSCOM	US Army Forces Command
FSH	Fort Sam Houston
GCS	Ground Combat School
GCW	Golden-cheeked Warbler
ha	Hectare
IRP	Installation Restoration Program
INF (M)	Infantry (Mechanized)
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
JTX	Joint Training Exercise
KFA	Karst Fauna Area
m	Meter
MA	Maneuver Area
MEDCOM	US Army Medical Command
MedEvac	Medical Evacuation
MI BN	Military Intelligence Battalion
MOA	Memorandum of Agreement
MOUT	Military Operation in Urban Terrain
NCO	Non Commissioned Officer
NOE	Nap of the Earth

NRCS	Natural Resources Conservation Service
SAPD	San Antonio Police Department
POL	Petroleum, oils, and lubricants
SARA	San Antonio River Authority
SWAT	Special Weapons and Tactics
TCA	Tactical Concealment Areas
TCEQ	Texas Commission on Environmental Quality
T&E	Threatened and Endangered Species
TNRCC	Texas Natural Resources Conservation Commission
TPWD	Texas Parks and Wildlife Department
TRS	Training Squadron
UHF	Ultra High Frequency
USACE	U.S. Army Corps of Engineers
USACERL	U.S. Army Construction Engineering Research Laboratories
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
USN	U.S. Navy
VHF	Very High Frequency

10.0 Glossary

Armored Vehicle – a vehicle, either wheeled or tracked, that has sufficient protective shielding, or armor, to defeat small arms fire thus protecting the vehicle and crew.

Battalion –

Bivouac – a temporary field encampment of military personnel.

Black Out Driving Course – A driver training course for operating military tactical vehicles at night where minimal illumination of the roadway is provided by vehicular-mounted indirect or reduced lighting so that potential enemy detection of the vehicle is diminished.

Bradley Fighting Vehicle – A small armored, tracked vehicle. The role of the Bradley Fighting Vehicle is to transport infantry on the battlefield, to provide fire cover to dismounted troops and to suppress enemy tanks and fighting vehicles.

Cantonment Area – a permanent encampment of military personnel.

Combat Assault Landing Strip – an austere airstrip constructed of compacted earth, typical of what would be found in a front-line or combat area, and of sufficient length and width to accommodate heavy aircraft such as the C130.

Company - A subdivision of a military regiment or battalion that constitutes the lowest administrative unit. It is usually under the command of a captain and is made up of at least two platoons.

Contact – In the military sense, contact is made when other military forces are sighted, communicated with, or engaged in battle.

Defensive Fighting Position – Can include Field Fortifications, Fox Holes, Trenches, and Crew Served Weapons Emplacements. A fighting position, usually dug into the ground and often reinforced, offers soldiers protection against enemy small arms fire.

Dismounted Training – training that occurs on foot i.e. away from, or dismounted from a vehicle.

Driver Training Course – An established course where the basics of the operation of various military tactical vehicles may be taught and practiced.

Drop Zone – A prepared area where parachute drops of containerized equipment, vehicles, and/or personnel may occur. Often an area cleared of trees or brush which could damage equipment, parachutes, or injure personnel.

Escape – To break loose from confinement.

Evasion – the avoidance of capture by unfriendly forces.

Field Hospital – a mobile, austere, but complete hospital facility located near to the battlefield, that can accommodate both battlefield injuries and routine medical care.

Field Kitchen – a mobile facility involved in food preparation for personnel operating in the field.

Field Sanitation - Necessary actions required for preservation of health and for prevention of disease, as they apply to food preparation and living in the field. Included are actions to safeguard food and water and the control of disease-carrying insects and animals.

Fixed Wing Aircraft – Aircraft, either propeller or jet driven, with lift created by non-moving, rigid, or fixed wings.

Hardened Bivouac – a field encampment with erosion-control applications such as graveled roads, tent pads, and drainage to preclude dust, mud and siltation.

III Corps- III Corps major units comprise the 1ST Calvary Division and 4th Infantry Division; as well as the 3rd Armored Calvary Regiment, the IIId Armored Corps Artillery, and the 13th Corps Support Command. The primary focus of III Corps was the reinforcement of NATO.

Impact Area – a limited-access area downrange of firing ranges where projectiles fired will fall back to earth.

Itinerant-Traveling from place to place, especially to perform work or a duty.

Land Navigation Course – also known as a compass course, where the basics of using a compass or Global Positioning System (GPS) is taught so that the student can learn to navigate cross-country from one specific location to another.

Litter Obstacle Course – an area where the basics of battlefield medicine is practiced, to include extrication of litter-bound wounded over a series of obstacles simulating that which could be found on the battlefield.

Magazine Area – an area where munitions are stored in enclosed structures which are referred to as “magazines.”

Maneuver Area – a land area where military units practice tactics, and maneuver to interdict or avoid enemy contact.

Mechanized Infantry – An infantry unit that moves into battle by armored support vehicles such as the Bradley Fighting Vehicle.

Mock Runway – A simulated runway that may be used in training airbase ground defense, or that may serve as an objective for a military exercise, but which no aircraft use.

Nap of Earth Training – Also known as by the acronym NOE, training involves relatively high-speed, low-level helicopter flight that uses terrain features such as hills and valleys to conceal flight paths from enemy observation, radar, and hostile fire.

Obstacle Course – A training course that consists of obstacles that require the development of physical skill and confidence to negotiate.

Orienteering – Similar to land navigation, requiring the student to navigate from one specific location to one or a series of other locations using a compass, Global Positioning System, map, or a combination thereof.

Patrolling – The action of covertly moving through an area searching for enemy troops or suspicious activity.

Platoon - A subdivision of a company of troops consisting of two or more squads or sections and usually commanded by a lieutenant.

Reconnaissance – The action of collecting, evaluating, and reporting information on an enemy either by air or land, either openly or covertly.

Refueling Station – An area where fuel containers are staged for refueling tactical equipment, vehicles, or aircraft. Fuel containers may include small containers, fuel bladders, or truck-mounted tanks.

Rotary-Wing Aircraft – a phrase applicable to helicopters which use a relatively long, narrow, rapidly spinning wing called a rotor to produce lift, thus allowing the aircraft to hover and fly.

Search and Rescue – The action of searching for and recovering victims of mishaps that may be the result of enemy action, equipment failure, or accident.

Static Position – Remaining in place, non-mobile.

Survival – A reliance on a collection of skills that will allow an individual to escape and evade an enemy, involving planning, improvising with minimal equipment, orientation/land navigation, and knowledge of fire making, food and water identification, and shelter construction.

Tactical Training – Training involving the practice and field application of the science and strategy of warfare.

Terrain Analysis – A study of land features such as distances between easily recognized points on the ground and map, slopes, presence of roads, rivers, fords, open areas, cover, bivouacs which offer dispersion, cover, and concealment, and hazards which may pose a threat or potential threat of an ambush.

Tracked Vehicle – A vehicle, usually armored, which moves on two tracks consisting of interconnected links forming a chain on which pads or cleats are mounted, much like a bulldozer. This chain moves on and is held in place by sprockets, rollers, and idlers. The ground pressure is relatively lower than that of wheeled vehicles, and the traction is significantly greater. This allows much heavier vehicles to traverse soft soils and to ascend steep slopes with little difficulty.

Training Area – At Camp Bullis, training areas are small sites within the larger maneuver areas, and which support a specific type of training.

Wheeled Vehicle Transit - Movement of wheeled vehicles from one point to another.